APRIL 21, 1958

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

Is Trade 'Reciprocal'?

U. S. machine tool builders say "No!" They urge Congress to make tariff revisions . . . Page 57

TOOL SHOW SECTION

Guide to Tool Steels & Carbides

Here is information to help you find and use more than 1100 different tooling materials . . . Opposite Page 96

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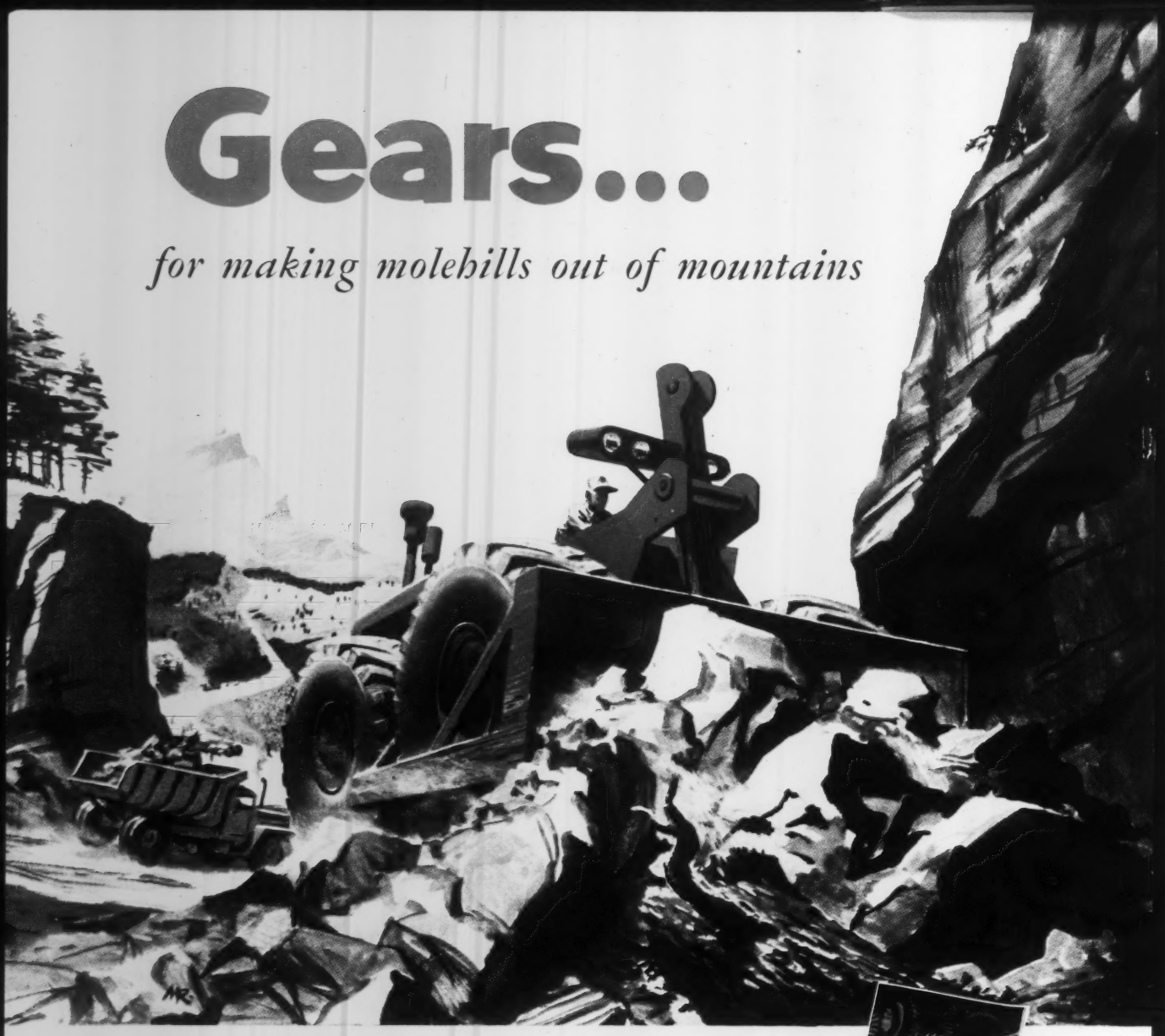
Gears...

for making molehills out of mountains



It is hard to imagine worse working conditions, and that is the very reason why the manufacturers of so many kinds of road building equipment install "Double Diamond" gears. Wherever the going is especially rough, wherever gears must give uninterrupted service on harsh, time-table schedules, you'll find our gears at work.

For low installed cost, for true operating economy and performance, and for buckling down to the hardest kind of service—nothing beats "Double Diamond."

Our salesmen are experienced gear engineers. Why not talk to one about your gear requirements?

May we send you a copy of this comprehensive catalog on the many gear types in which we specialize?

EATON

AUTOMOTIVE GEAR DIVISION
MANUFACTURING COMPANY
RICHMOND, INDIANA

GEARS FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

Special Bolting Requirement?

USE A SPECIAL FASTENER

The range of Bethlehem standard fasteners is wide enough to handle most bolting requirements. But quite often a special job calls for a special fastener, one designed to meet a specific need. Special fasteners are likely to be the economical answer, especially when the quantity is large enough to absorb the cost of special tools and machine set-up.

We're old hands at designing and producing fastener "specials." At Bethlehem's modern plant in Lebanon, Pa., we're constantly turning out the unusual in headed and threaded products. Our fasteners engineers are often able to improve on the design of the bolts you're now using. But not always. When a special fastener is not practical, we'll say so frankly.

So whether you need standard or special fasteners, let's talk it over. We'll gladly study the problem and make our recommendations. Just get in touch with the nearest Bethlehem sales office, or write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

New Team . . .

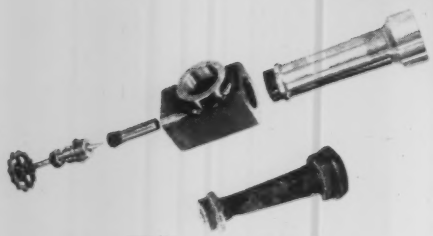
TITANIUM AND ZIRCONIUM

for your corrosion problem areas

Chart shows corrosion resistances of zirconium and titanium to typical chemicals.

TYPICAL CORROSION RESISTANCES OF ZIRCONIUM AND TITANIUM

CORROSIVE MEDIA	METAL RESISTANCE	
	ZIRCONIUM	TITANIUM
Sulfuric Acid	excellent to good below 80%	good below 5%
Nitric Acid	excellent	excellent
Hydrochloric Acid	excellent	good below 10%
Phosphoric Acid	excellent to fair below 85%	poor
Chromic Acid	excellent	excellent to good
Aqua Regia	poor	excellent
Wet Chlorine Gas	poor	excellent
Chlorine Water	excellent	excellent
Sodium Hydroxide	good below 90%	good below 50%
Ferric Chloride	poor	excellent
Calcium Chloride	excellent	excellent
Cupric Chloride	poor	excellent
Sodium Chloride	excellent	excellent
Ammonium Chloride	excellent	excellent
Aluminum Chloride	excellent	excellent to fair



Steam jet made of zirconium, which has given trouble-free performance after a year in hydrochloric acid service. For comparison, a throat piece from a steam jet (below) is shown after only a week of similar service.

By specifying titanium or zirconium for processing equipment, you can now overcome most of the corrosive media which attack other metals.

Even with such hard-to-handle chemicals as chlorides and oxidizing acids, equipment can have extremely long service life when made from these corrosion-resistant materials. Problems of product contamination in chemical and food processing can also be virtually eliminated.

Mallory-Sharon is in position to offer you *both* titanium and zirconium mill products for equipment fabrication—plus engineering assistance and unbiased recommendations on the most suitable material.

Titanium is now available from stock in a complete range of mill products, may be readily fabricated, and more than pays its extra cost where ordinary metals fail. Zirconium facilities are being rapidly increased, and mill shapes are now in production.

For information on the corrosion-resistant properties of titanium or zirconium write Mallory-Sharon Metals Corporation, Niles, Ohio.

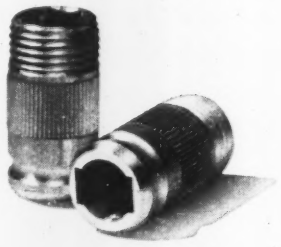
MALLORY-SHARON

METALS CORPORATION • NILES, OHIO

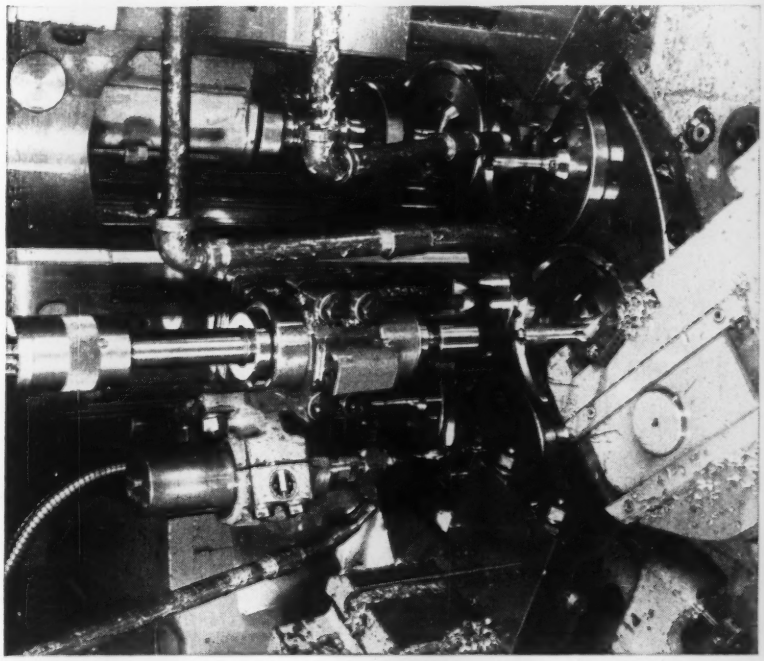
Integrated producer of Titanium • Zirconium • Special Metals

At Porter-Cable Machine Company.....

6-Spindle Automatic saves $12,700 on this one job!



A savings of over 7½¢ was realized on each of these small brass Brush Holder Bodies for electric motors when this formerly subcontracted work was handled on one of their 1¼" Warner & Swaseys.



Porter-Cable of Syracuse, N. Y., veteran producer of wood-working tools and powered garden equipment, reports through their Chief Manufacturing Engineer, Charles Allen: *"Our two Warner & Swasey 6-Spindle quick setup Automatics have an important place in our cost-reduction program. They consistently turn out the highly accurate parts our products require, saving us money on jobs that run in lot sizes from a few hundred to many thousand pieces."*

Here's what Warner & Swasey 6-Spindle Automatics did for Porter-Cable Company:

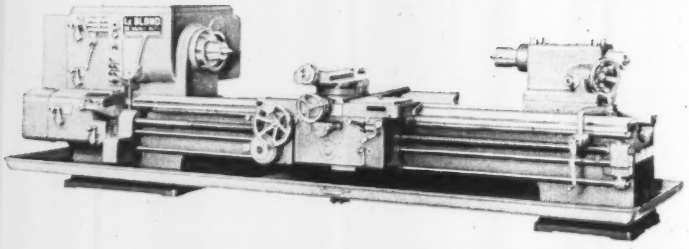
- **ACCURACY**—Tolerances of plus or minus .001" easily held, maintaining high product quality.
- **SAVINGS**—Second operations were eliminated—handled complex work formerly subcontracted.
- **FAST SETUP—SMALL LOTS**—Jobs previously run on hand screw machines now more efficiently handled on the Automatics.
- **VERSATILITY**—Machining of tougher materials, parts with threads at each end, multiple diameters, broached holes are all now routine operations.

Why not have our Field Engineers evaluate your operations with a view to highlighting jobs that could be more profitably machined on modern Warner & Swasey Multi-Spindle Automatics? He's as near as your phone—call him today!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

THE RUGGEDEST LATHES IN EVERY CLASS YOU'LL FIND IN THE LINE OF



This is the LeBlond 25" heavy duty lathe—stamina plus, with precision. LeBlonds are famous for their ability to stand up to the toughest turning—year after year after year. Sound engineering is the reason, dependable performance is the result. Write for your LeBlond Complete Line Catalog No. C-58.

LEBLOND

THE R. K. LEBLOND
MACHINE TOOL CO.
CINCINNATI 8, OHIO

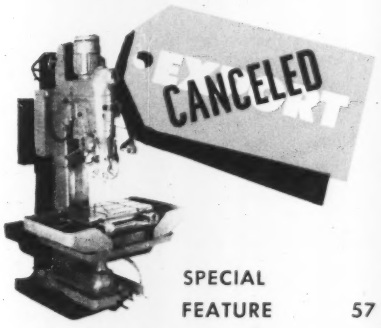
World's Largest Builder of A Complete Line of Lathes for More Than 71 Years

This Week in STEEL The Metalworking Weekly

April 21, 1958
Vol. 142 No. 16

EDITORIAL 55

Most recession remedies will lead to more inflation. STEEL suggests: Hold down wages, costs, prices.



SPECIAL FEATURE 57

Machine Tool Builders Fight Trade Squeeze—Imports gain momentum; export business is tougher to get. This article tells how builders view their problem: It includes their recent tariff proposal to Congress.

WINDOWS OF WASHINGTON 64

Look for Congress to cut the President's $3.9 billion request for foreign aid to about $2 billion.

MIRRORS OF MOTORDOM 71

A. O. Smith Corp. uses separate project teams to get auto frame lines into production. It cuts down on number of headaches.

THE BUSINESS TREND 75

Business may pick up a bit this spring, but not enough to reverse the Federal Reserve Board's production index.

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STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $20 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday and copyright 1958 by Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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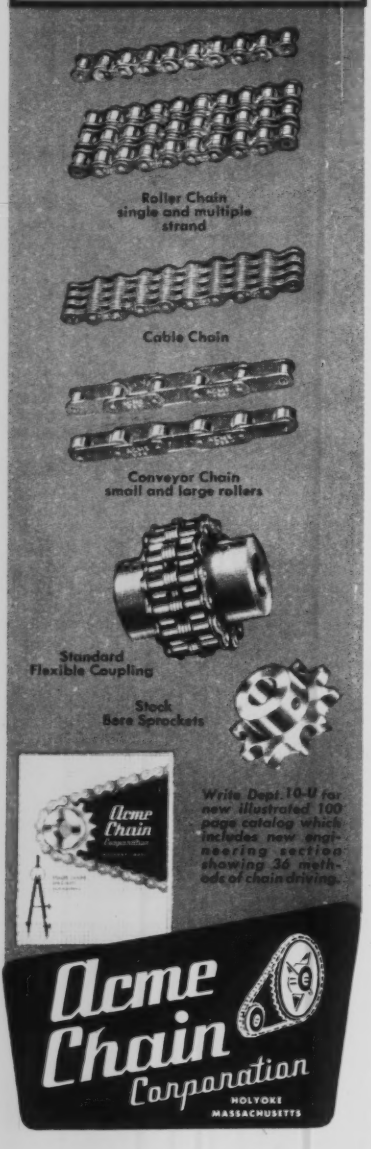
PROMPT DELIVERY in all sizes on

ACME

CHAINS — SPROCKETS COUPLINGS IN ANY QUANTITY FROM YOUR DISTRIBUTOR


Roller Chain
single and multiple strand
Cable Chain
Conveyor Chain
small and large rollers
Standard Flexible Coupling
Stock Bore Sprockets
Acme Chain
Write Dept. 10-U for new illustrated 100 page catalog which includes new engineering section showing 36 methods of chain driving.
Acme Chain Corporation
HOLYOKE MASSACHUSETTS

behind the scenes

Awards Away!

In one of our recent contests, readers were invited to pick what they considered to be the ten best ads appearing in the Mar. 10 issue, and STEEL artists were asked to guess which ads the readers had selected. The artists lost.

Selections by readers averaged out this way: 1. Koppers Co. Inc. 2. General Electric Co. 3. Sun Oil Co. 4. Superior Steel Div. of Copperweld Steel Co. 5. Botfield Refractories Co. 6. Dravo Corp. 7. Allis-Chalmers Mfg. Co. 8. United Engineering & Foundry Co. 9. Haynes Stellite Co., a division of Union Carbide Corp. 10. Timken Roller Bearing Co.

The artists thought the readers would select: 1. GE. 2. Koppers. 3. Sun Oil. 4. Superior Steel. 5. Timken. 6. Elastic Stop Nut Corp. of America. 7. Ohio Crankshaft Co. 8. Fairbanks, Morse & Co. 9. Allis-Chalmers. 10. Dravo Corp.

We rounded up seven original sketches the artists made as forfeits, and sent them to contestants whose names we pulled out of a hat:

E. J. Machemer, Avionics Div., Bell Aircraft, Buffalo; Robert F. Marlowe, Fairbanks, Morse, Chicago; C. J. Polivka, Cumberland Case Co., Chattanooga, Tenn.; Hallock C. Campbell, Arcos Corp., Philadelphia; Raymond B. Koehler, Ordnance, Pentagon, Washington; Charlsie Vunovic, Granite Steel Castings Corp., Granite City, Ill.; Patrick J. Kearney, Cleveland. Thank you one and all for your kind attention.

Name That Steel & Carbide

Taking the gloomiest view of the 44-page insert, "A Guide to Tool Steels & Carbides" (following Page 96), we will stipulate that neither social workers nor window trimmers will be stirred to pelt STEEL with orchids because of it, but the metalworking world, we feel, will rise in universal acclaim.

We base our reasoning on the fact that when STEEL produced a similar tool steel and carbide guide a few years ago, readers ordered more than 2000 extra copies. The present edition was revised and brought up to date by Machine Tool Editor Bob Huber and Editorial Assistant Jane Wedge. The job was almost as difficult as assembling a telephone directory. Dozens of alloys were dropped, and even more were added, and by the time Mrs. Wedge finished checking proofs against the voluminous correspondence, her pretty eyes had grown quite patriotic—you know, red, white, and blue.

Letters

The Lindberg Engineering Co. sent a news release to STEEL describing its GT-34 furnace which has a metal-ceramic tube assembly, covering heat treating applications up to 2750° F. The item appeared Feb. 3, and we switch now to the east end of Lake Erie. A Mrs. Willard K. Haney of Buffalo saw the item in a copy of STEEL brought home by her husband. She was interested enough to write to the Lindberg people. "How big is the furnace?" she wrote. "Will it fit into the average kitchen? Do you sell special pans and serving dishes that will not melt or crack at these temperatures? I have always felt that if a little heat will do a cooking or baking job in a certain amount of time, more heat should do it a lot faster and give us busy housewives a lot more time for important things."

John R. Gorey, sales promotion manager for the Lindberg Engineering Co., passed the letter along in the belief that we might be interested. Ah, well, the world stands in need of more delightful persons like Mrs. Haney.

Another lady, Mrs. B. Cameron, a lovely young Canadian who graces the Canada Works of the Steel Co. of Canada Ltd., Hamilton, Ont., was frank enough to confess that the fragile fraction puzzle was a pleasant relief after some of the rougher deals occasionally submitted here. Incidentally, her correct answer of 2/7 was the first to arrive. (The five sailors, by the way, had 3121 coconuts.)

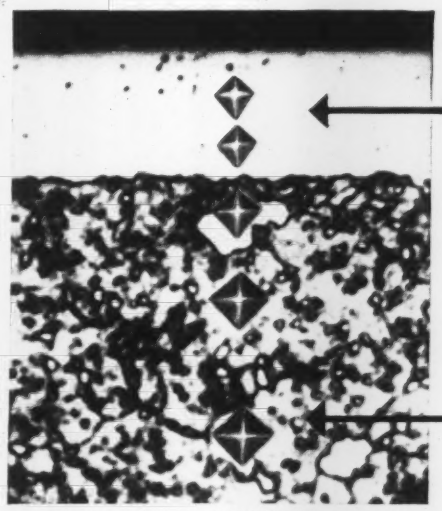
The spokesman for the Granite Steel Casting Corp., Granite City, Ill., inquired if STEEL's Editor Walt Campbell is any relation to Tom Campbell, editor-in-chief of *Iron Age*. We came right out and asked Walt. "Say, are you any relation to a Tom Campbell, who is editor of a certain competing metalworking weekly which shall be nameless on account of we are known for our tact?"

"We're often confused with each other," replied our Mr. Campbell. "Once we were even introduced to the President of the United States, he as Walt and I as Tom. We're good friends, but not relatives—at least not closer than a couple of thousand years."

Detroit editor, foxy Don Postma, tells us that the English say "frazing" when they mean "deburring," and "swarth removal" when they mean "chip disposal." He said we would be green with envy to learn that he knew two words that we didn't. His letter, however, indicates that he knows three more because he refers to our "veridian" hue, whereas the English would probably use "viridian."

Shirdlu

(Metalworking Outlook—Page 51)



Conditions: Nital Etch, (1500 X), 10 gram load

Photomicrograph of Vickers test on AISI 440-C Air Hardening Tool Steel after ASC Diffusion treatment, indicating core and surface hardness.

70-76 Rc SURFACE HARDNESS

60-63 Rc CORE HARDNESS

without Heat Treatment

The new, revolutionary ASC Metal Diffusion Process provides the surface hardness and core hardness you require on Air Hardening Steels *without the necessity of further heat treatment.*

. . . for sliding, rolling, driving or driven applications where frictional *wear* is created by mating parts action.

. . . for high temperature applications where *wear* resistance is vital.

. . . for corrosion applications where high or low temperature causes excessive *wear.*

The unique ASC Metal Diffusion Process produces a carbide wear surface that becomes an integral part of the parent metal: It is not a plating. It is not a coating. It is not a cladding. ASC processed metals will not craze, crack, or peel. Dimensions will not increase more than 0.001" in any direction through processing.

We'll be glad to process samples and recommend the best steel for your particular application.

Write or call, there's no obligation.

TYPICAL APPLICATIONS

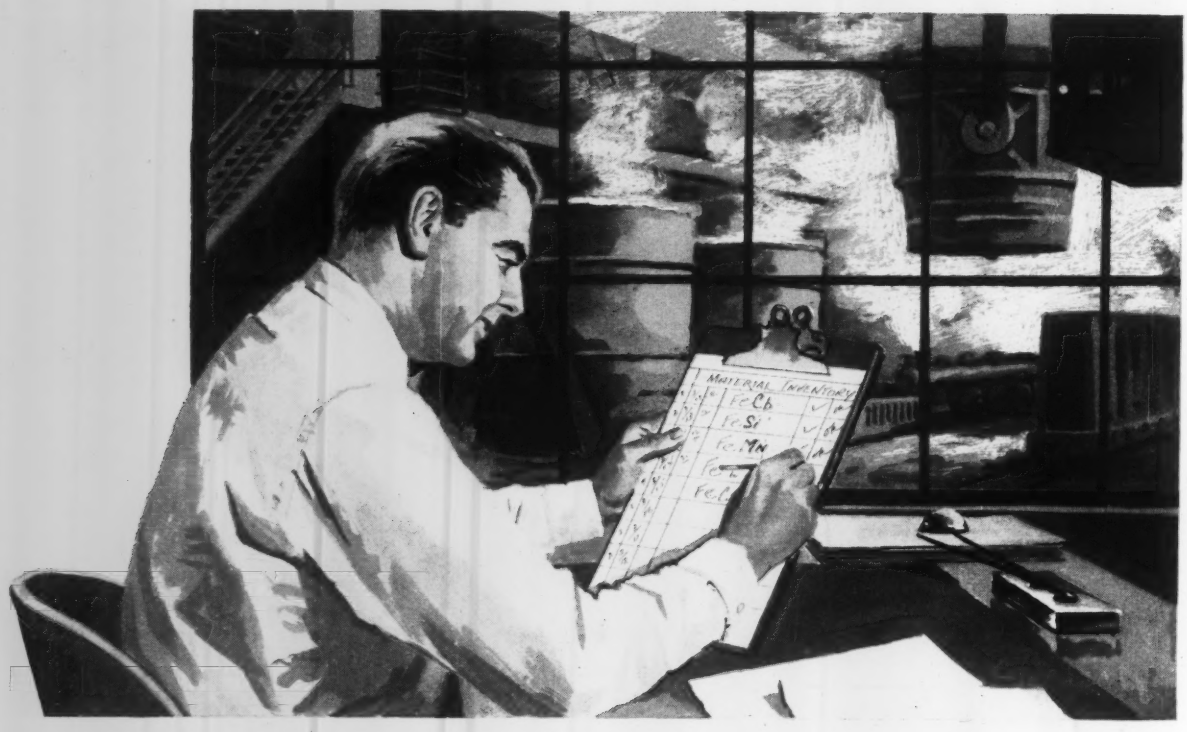
Forming, crimping and seaming rolls
Mandrels for cold drawing tubing
High temperature bearings
Metal drawing and extruding dies
Plastic extrusion dies
Cams and cam followers
Pump plungers, discharge valves and seats

RECOMMENDED STEELS

AISI type D1, 2, 3 tool steels
440 A, B, C, Stainless
Hi-speed steels not containing tungsten
Trade Name Steels such as:
BR-4
CCN
Ontario
Airdi 150
Vasco Jet 1000
Cromovan
Carpenter 610

ALLOY SURFACES COMPANY

104 South Justison Street, Wilmington 1, Del.
Phone: OLympia 5-6344



Unlimited Columbium for industry

With the world's largest raw material reserve of columbium, MCA can now assure steelmakers that columbium is readily available in quantity and will continue to be in plentiful supply for future needs.

In Type 347 stainless for example, long recognized for reliability in corrosion resistance, manufacturers no longer are faced with imposed restrictions requiring the use of substitute materials. Welding rods destined for severe service offer another advantageous use for columbium. Our continuing research and experience indicates that wherever design demands a material that will meet rigorous requirements—especially in heat and corrosion resistance—columbium's properties are being found most rewarding.

MCA experience in columbium steels is very broad, including many new uses. Steelmakers, engineers and metallurgists are invited to write, stating their particular interests, for a prompt and confidential response.

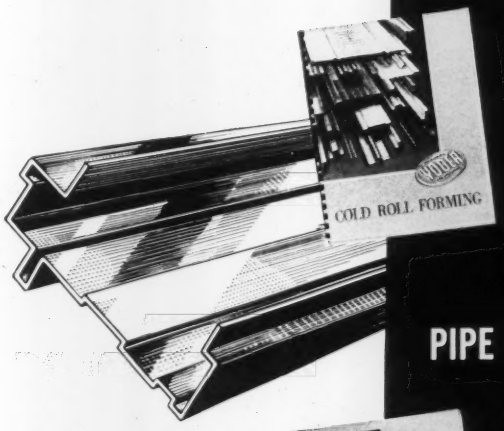
MOLYBDENUM

Grant Building CORPORATION OF AMERICA **Pittsburgh 19, Pa.**

Offices: Pittsburgh, Chicago, Los Angeles, New York, San Francisco
Sales Representatives: Brumley-Donaldson Co., Los Angeles, San Francisco
Subsidiary: Cleveland-Tungsten, Inc., Cleveland
Plants: Washington, Pa., York, Pa.

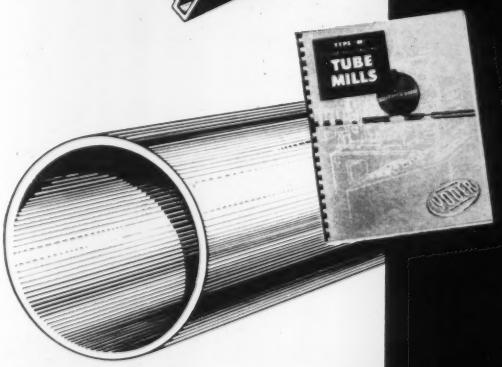
MCA

FREE YODER BOOKS OFFER "KNOW-HOW" ON ROLL FORMING • TUBE MAKING • SLITTING



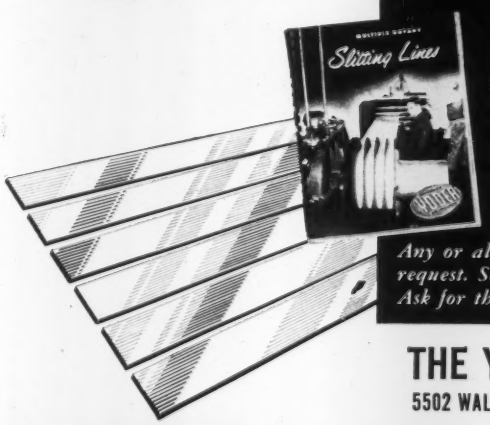
COLD-ROLL FORMING

Structural, ornamental and tubular shapes from stock up to ½" thick. Surface finish, uniformity, stock selection and characteristics, plating problems, production costs, end uses and applications. Auxiliary automatic operations including perforating, notching, welding, coiling, embossing. 88 pages, fully charted and illustrated.



PIPE AND TUBE MAKING

Ferrous or non-ferrous, electric weld, resistance and induction or gas types. Small or large diameter. Tooling, welding, stock ranges, personnel training, quality and tolerance control, speeds, power consumption, annual production rating charts. 64 pages, fully illustrated.



SLITTING

Operating techniques, time studies, analyses of operating cycles, coil handling, scrap disposal, selection of slitters and setting up of slitting lines, including coilers and recoilers. Advantages of slitting and how to compute "profit-point". 76 pages, fully illustrated.

Any or all of these books are free upon request. Send for your copies today . . . Ask for them by title.

THE YODER COMPANY

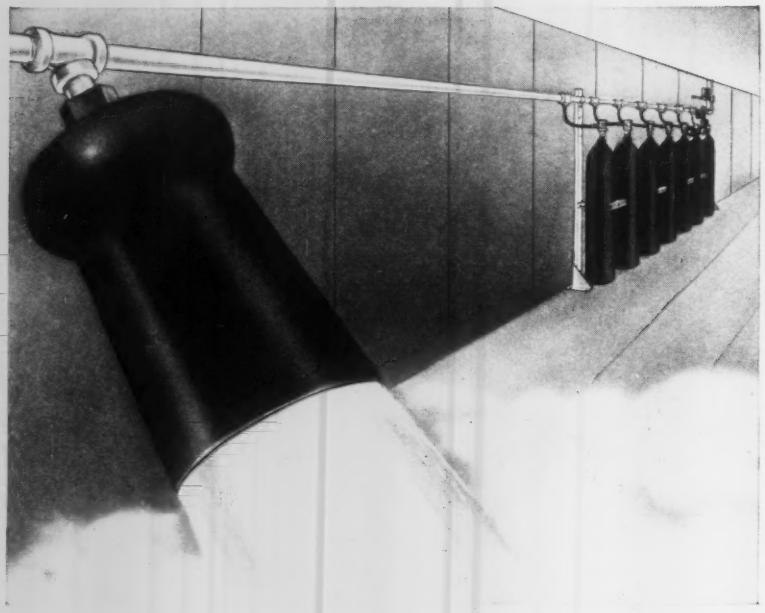
5502 WALWORTH AVE. • CLEVELAND, OHIO

ENGINEERING YODER MANUFACTURING

COLD ROLL FORMING MACHINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)

ROTARY SLITTING LINES



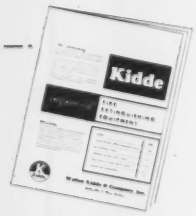
24-HOUR-A-DAY AUTOMATIC FIRE PROTECTION!

Install a built-in Kidde Fully-Automatic Carbon Dioxide Fire Extinguishing System, and you install the finest, most dependable round-the-clock fire protection on the market today. Individually designed to fully guard even the most dangerous hazards, Kidde systems offer tailor-made fire protection for dip tanks, spray booths, oil bath air filters, record vaults, generator rooms . . . *any* hazard in which fire can develop and spread!

Because they use dry, clean non-damaging carbon dioxide as an extinguishing agent, Kidde systems can be installed to protect intricate machinery or delicate electrical equipment. Carbon dioxide smothers fire the instant it starts, then vanishes quickly into thin air. It leaves no mess, no clean-up job afterwards!

Kidde systems are pressurized – there are no falling weights, no clumsy mechanical triggering methods. Special rate-of-temperature-rise detectors trigger the system at the first flash of fire, Pneumatic control heads insure instantaneous and complete system discharge. All operating parts are self-enclosed for safety. Visual indicators show at a glance whether system is "set" or "released." Directional valves allow protection of more than one hazard from the same bank of cylinders. There are no parts to replace after a fire.

For more information on Kidde systems, and how they can protect your plant from fire, send the coupon or write today for Kidde's Engineered Fire Equipment Booklet.



WALTER KIDDE & COMPANY, INC.
460 MAIN STREET, BELLEVILLE 9, N. J.

Please send me your Engineered Fire Equipment Booklet, I-19 and complete information on Kidde systems. I am interested in protecting the following hazards

NAME

ADDRESS

CITY STATE

LETTERS TO THE EDITORS

Cover Picture Excites Comment

Before your Mar. 31 issue reached my desk I received letters and telephone calls from friends around the nation commenting on my picture on the front cover.

This morning's mail brought my copy, and when I went to the Algonquin Club in Bridgeport for lunch, it would seem as though every member gets the magazine.

A. V. Bodine

President
Bodine Corp.
Bridgeport, Conn.

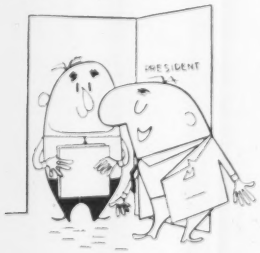
Financial Analysis: Useful

I receive your weekly issues regularly and always read them with great interest. In the Mar. 31 issue is the report, "Steel Sales and Profits Set Records" (insert), which gives the financial analysis of the steel industry for 1957. Please send three reprints of this useful and interesting study.

Frank Kullmer

Vice President
Soule Steel Co.
San Francisco

Selling Idea to Boss



Please send 15 reprints of the Cost Crisis article, "How To Sell Ideas to Bosses," (Apr. 7, Page 71). We want to present them to our management in formulating a program.

James J. Wall

E. F. Hauserman Co.
Cleveland

Takes Issue with Article

May we call attention to the article, "Mill Uses Fireproof Hydraulic Fluid" (Feb. 3, Page 117), and take issue with statements therein? E. F. Houghton & Co. provides all types of fire resistant fluids and is not biased regarding any one variety.

You say: Straight synthetic was ruled out. It is potentially toxic and can corrode some parts of a hydraulic system.

That is misleading because it may apply to any hydraulic fluid. Toxicity is relative, and no hydraulic fluid now being marketed is dangerously toxic.

Another quotation: Water based synthetic causes rust and sludge and needs control of pH and viscosity.

This implies that rust, sludge, and prod-

(Please turn to Page 12)

For superior drawing, lower costs . . .

put *Automation* In Your Deep-Draw Lubrication . . . . . .

"Go automatic" with a continuous high-speed drawing-lubricant system from Pennsalt. You'll get superior drawing from lubrication that is always exact . . . high production rate with no interruptions from raw stock to press bed.

Pennsalt automatic systems eliminate chemical waste, provide clean working area, reduce excessive handling . . . and compact design saves valuable floor space.

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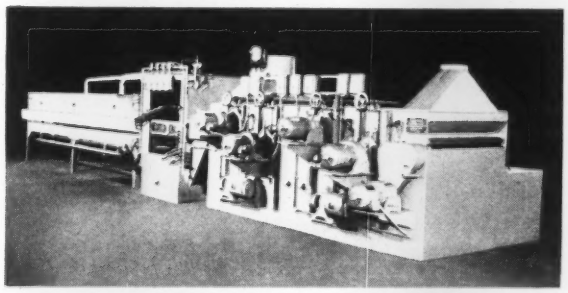

Completely automatic White-Roth deep draw lubrication system processes sheets, strip, plate, blanks and other forms at speeds up to 100 feet per minute.

Pennsalt Systems Feature . . .

White-Roth metal preparation machines . . . exclusive from Pennsalt . . . for automatic cleaning of stock, application of undercoatings and lubricants, and drying. Automatic loading and unloading available.

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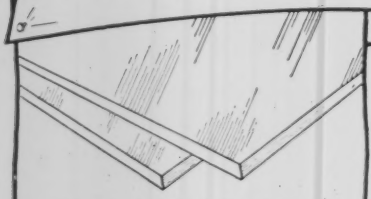

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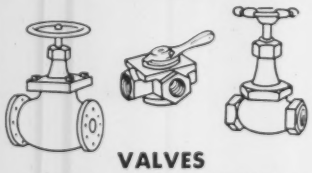
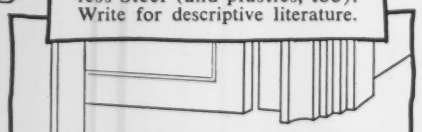


VALVES
All major types are available from stock in Aluminum, Inconel, Monel, Nickel and Stainless Steel (and plastics, too). Write for descriptive literature.



ARCHITECTURAL SHAPES
Copings, gravel stops and door saddles are just a few of more than two hundred Alcoa aluminum shapes available off the shelf, and illustrated in booklet titled "Shapes." Monel, Stainless and Copper roofing items complete the Whitehead line of architectural materials on hand.

These "Plus Items" and many more are available in addition to a wide selection of corrosion-resistant sheet, rod and tube.

All told, there are more than 20,000 items distributed and serviced by Whitehead. All are available, off-the-shelf, from the nine Whitehead Metal "Supermarkets." All are the products of such leading producers as Alcoa, Anaconda, Inco & Crucible Steel to name just a few.

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LETTERS

(Concluded from Page 10)

uct control are inherent in water base (water-glycol) fluids alone. On the contrary, more difficulty may be encountered with emulsion fluids on stability—separation of oil from water—than with water and pH control of water-glycol fluids. Furthermore, water is evaporated in precisely the same way from emulsion fluids as from water-glycol fluids and must be replenished in both types.

Regarding rust protection, it should not be stated that either the emulsion type or the water-gylcol type excels. This property depends upon the additives used to prevent rusting either in the liquid or vapor phase, or both.

"Sludge formation" is not a fair description of foreign materials which may be found in water-glycol fluids after extended use. When these have been changed over from oil systems, some oil sometimes remains in the system and does not mix with the new fluid but floats on the surface as a scum. This is sometimes erroneously termed "sludge." This is not a breakdown of the fluid itself as might occur in an emulsion type where the petroleum oil and emulsifier may oxidize to form sludge.

Water-glycol fluids retain their original properties far longer than do emulsion fluids; this can be proved by many case histories.

Let's be fair to all types of hydraulic fluids.

C. R. Schmitt
Manager, Lubrication Sales Dept.
E. F. Houghton & Co.
Philadelphia

Whitecollar Drive on Plateau

The article, "Whitecollar Drive To Resume in '59, '60" (Mar. 24, Page 65), is both interesting and enlightening. I would appreciate a reprint.

Dr. C. H. E. Beck
Section Engineer
Missile Systems Div.
Lockheed Aircraft Corp.
Sunnyvale, Calif.

Company Wants New Product

We are interested in finding a new product to manufacture. We make special equipment. In the article, "Licensing: A Road to Profit" (Feb. 24, Page 46), you mention two organizations that deal in inventions and their licensing. What are their addresses and whom can we contact?

Ralph Schwarz
President
Michigan Production Engineering Co.
Hazel Park, Mich.

• *E. W. Wickert is manager of licensing operations at Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill. Contact H. Gordon Howe of the Patent Development Commission at Research Corp., 405 Lexington Ave., New York 17, N. Y. You might also write to the U. S. Patent Office in Washington and request the bulletin which lists licenses available on a royalty-free basis.*

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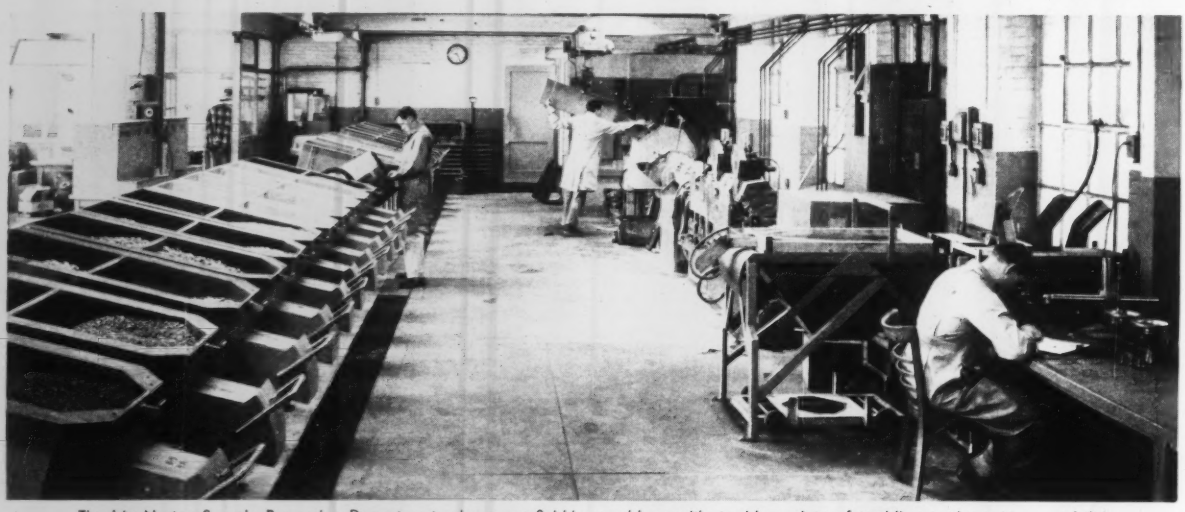
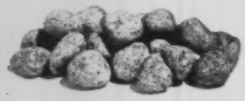


The big Norton Sample Processing Department solves your finishing problems with a wide variety of tumbling equipment . . . and the right abrasive to do the job.

to find the tumbling abrasive you need



ALUNDUM* TUMBLEX* "A" Abrasive. For general barrel finishing. Removes flash, scale, tool marks and burrs, while forming radii and finishes to required micro-inches. Seventeen sizes.

ALUNDUM TUMBLEX "T" Abrasive. Bonded, triangular and fast-cutting for special shaped parts. They won't wedge in work slots or holes. Four sizes.

ALUNDUM TUMBLEX "S" Abrasive. Bonded spheres that get into areas where other shapes can't reach. Exceptionally dense and long lasting. Five sizes.

TUMBLEX "N" Abrasive. Natural stones, exclusively Norton. For high lustre, especially on die castings and soft metal. Rounded shape brings up highest lustre. Seven sizes.

G-341

If you're still finishing metal parts the long, hard way, now's the ideal time to find the fastest, most effective barrel finishing equipment, methods and abrasives.

For example, one leading aircraft parts manufacturer reports saving over $90,000 yearly by shifting from hand-finishing to barrel finishing with Norton TUMBLEX abrasives.

There's one sure way for you, too, to get these cost-cutting, product-improving "Touch of Gold" advantages. Your metal parts can range from tiny needles to hefty forgings . . . may be simple or complicated, hard metals or soft . . . may require deburring, descaling, better color and closer finish. Just send sample parts to our Sample Processing Department. They'll be returned to you completely finished to requirements, with a detailed report. Or, next time you're in our area, drop in and learn how your finishing can be improved.

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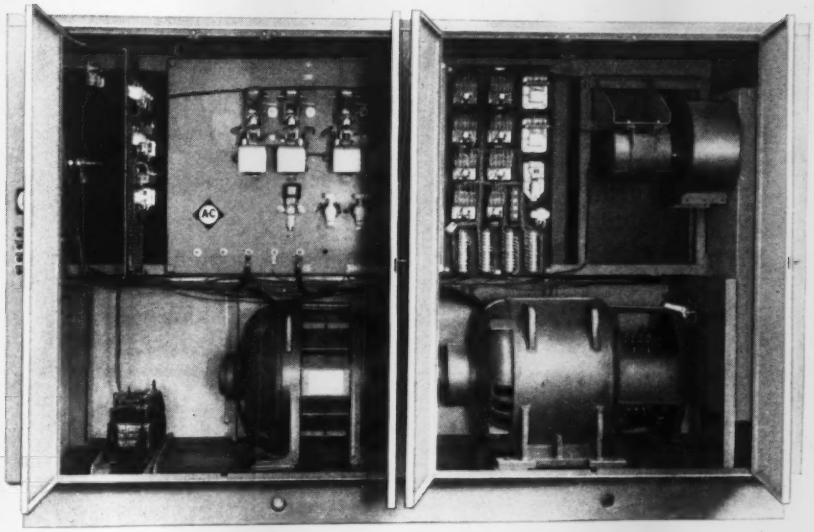
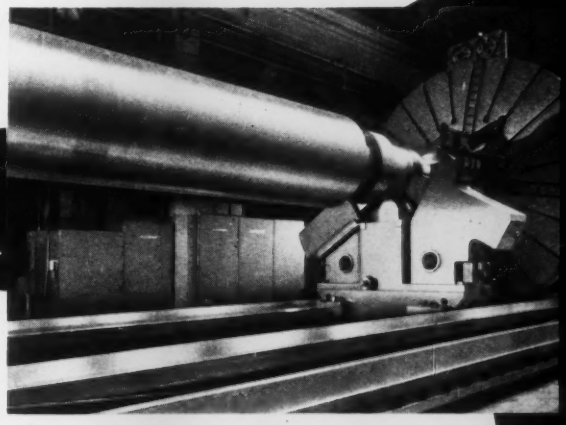


Size 5 *Ultra-Speed* power unit, rated 125 hp, providing reversing and regenerative braking.

This 14-foot lathe uses constant speed and quick stops, starts and reversals.



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Available in standard sizes 1 to 6, 5 to 200 hp., larger sizes on request.

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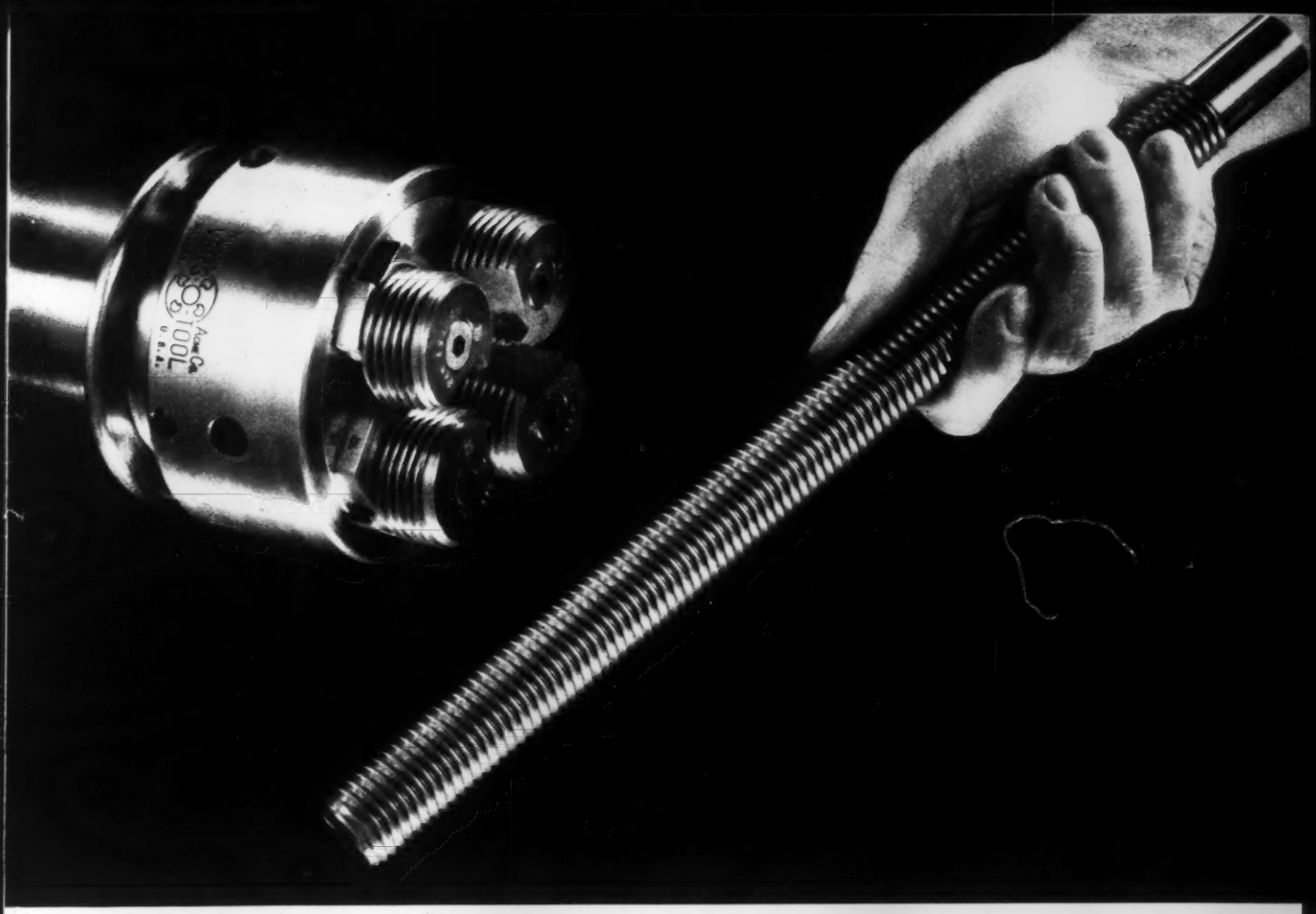

VERS-O-TOOL cuts 10.3 miles of thread per grind on this job . . .

The Federal Screw Works had a real problem in threading. They had received a large order for 1"x13" adjusting screws. Using most thread cutting methods this would be a big, costly assignment.

Federal put a Namco 1⅝" DR Vers-o-Tool on the job and as a result, found they had to grind the chasers only once for approximately 2000 pieces. This means that each grind cuts well over 10 linear miles of thread. Threading cost per piece was amazingly low.

Remember, Vers-o-Tools can be used with your present turning equipment, lathes, drill presses or automatics. No investment in special machines required.

Find out how you can put Vers-o-Tools to work reducing your thread cutting costs. Write for a free copy of Booklet DT-52.

You can grind and regrind Vers-o-Tool circular chasers to a full 270° of the chaser circumference.

See Vers-o-Tools demonstrated at the A. S. T. E. Tool Show in Philadelphia, May 1-8, Booth #2115

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The booklet you will receive gives you the *facts* you need to evaluate this new alloy for your own use. In its pages, you will find listings of physical and mechanical properties; high temperature properties; corrosion resistance data; essential fabrication information. You'll find typical properties of some fabricated items reported, too.

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So send in the coupon today for your free copy of the detailed Metallurgical Report on new SILNIC (T.M.) BRONZE by Chase. Or see your nearest Chase Representative at any convenient office or warehouse listed below. But don't delay --find out about SILNIC BRONZE now!

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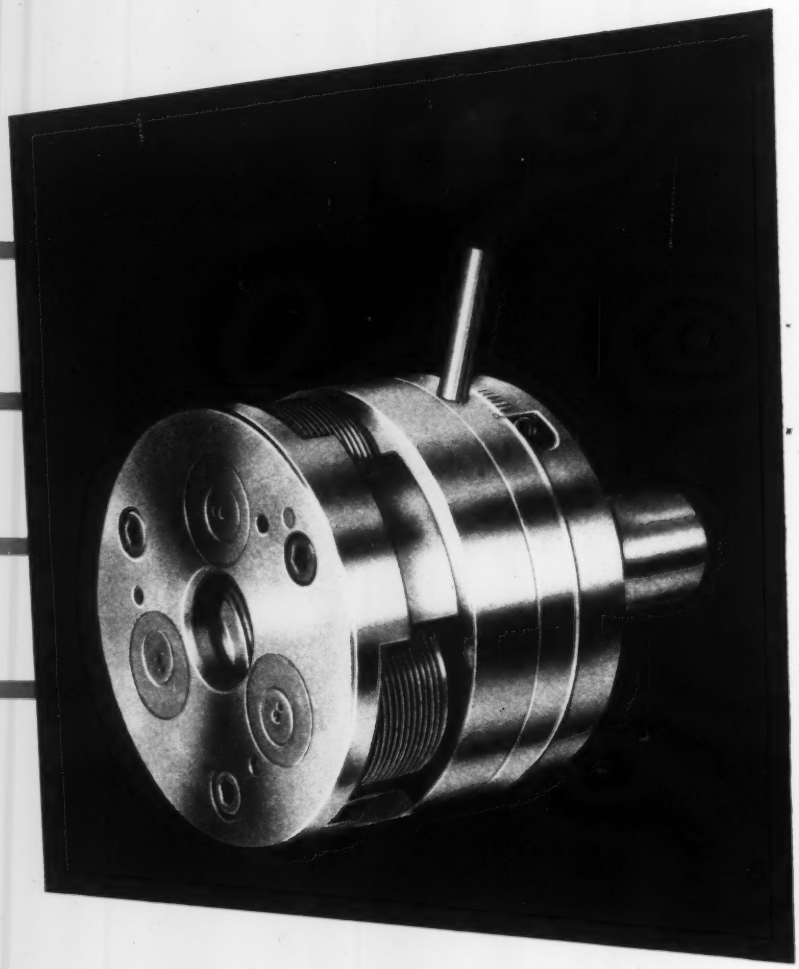
NEW LANDIS THREAD ROLLING HEADS



LANDIS Research has now developed the LANDIS Thread Rolling Head, exclusively featuring **replaceable helix angle bushings.** This unique basic design, through the use of relatively inexpensive bushings, allows rolling threads with exact helix angles without purchasing major head components.

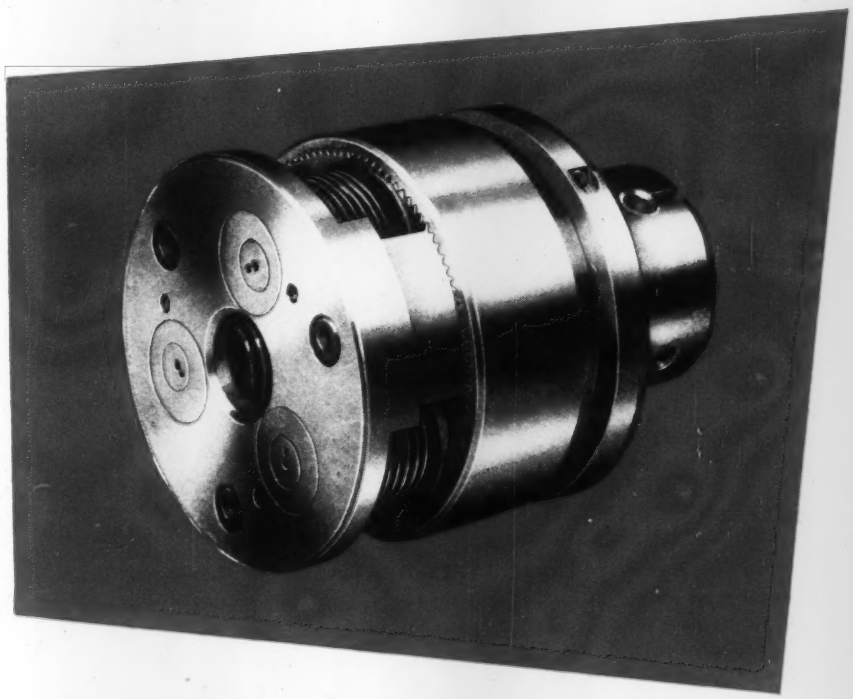
LANDIS Thread Rolling Heads will produce Class 4 threads of excellent finish at high speeds without impairing roll life. Rotary and Stationary styles are now available with a range of 5/16″ - 5/8″ UNF and UNC—with larger models also available in the near future.

For complete information on the new LANDIS Thread Rolling Heads, please write and request Bulletin F-99.

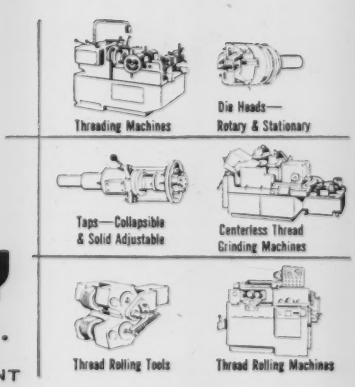
LANDIS Thread Rolling Heads can be operated at speeds used for carbide tooling, and produce strong accurate threads to Class 4 fit. Threads are of excellent microstructure and have a smooth burnished finish devoid of tool marks. After initial size has been established, these Heads can be operated indefinitely without adjustment as thread rolls never require regrinding. In addition, for maximum economy, the rolls are designed in a manner which allows them to be reversed and both ends used.

Both Stationary and Revolving styles of LANDIS Thread Rolling Heads are self-opening in operation. The Stationary Head is designed for turret lathes, hand screw machines and bar automatics employing a stationary type head; while the Revolving Head is for application to bar automatics, threading, drilling, tapping and other machines utilizing a revolving type head.

One of the outstanding features of LANDIS Thread Rolling Heads is the use of replaceable helix angle bushings. One set of standard bushings function to roll both UNF and UNC threads. The helix angle established for this standard bushing set is a "mean" angle suitable for rolling all diameters and pitches within the respective UNF and UNC ranges of the Heads. However, when the exact helix angle is required, the proper helix angle bushings can be substituted for the standard bushings. This eliminates the need to secure costly major head components.



These THREADING TOOLS displayed at Booth 1538 ASTE Show



LANDIS *Machine* COMPANY

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THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

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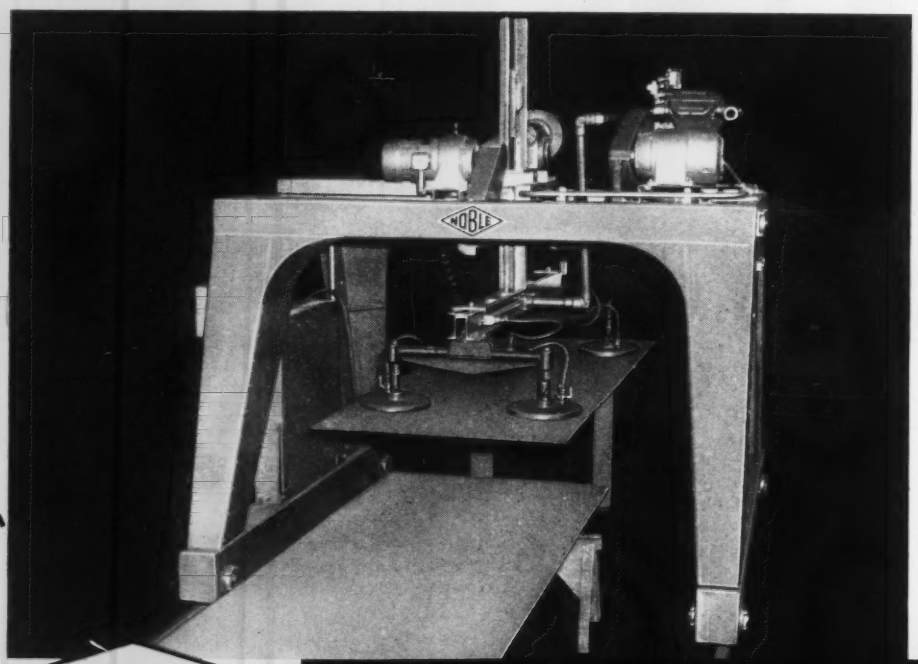
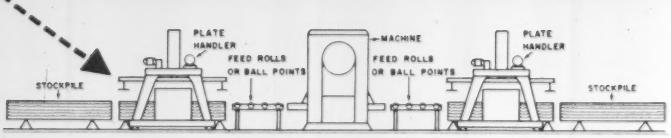


WITH A

NOBLE *Automatic*

PLATE HANDLING SYSTEM



NOBLE Automatic Plate Handling Systems eliminate the costly, often hazardous manual handling required in processing plate and sheet.

NOBLE handlers automatically pick up from a pile or conveyor, transport and deliver plate or sheet stock to the machine, pick up worked pieces from the machine and deliver them to piles or conveyors. Increase your profits by:

1. **Reduced handling costs** — no handling crews required, no prolonged crane tie-ups.

2. **Better machine utilization** — NOBLE automatics deliver and remove plate as fast as the machine can operate. There's no idle standby while operators wrestle a plate into position.

3. **Increased production** — NOBLE users report gains of 20% or more, depending on conditions, as the result of faster handling and reduced idle machine time.

THREE TYPES AVAILABLE

Standard NOBLE automatic plate handling systems are available in floor-mounted rail, overhead rail and radial transfer types. Standard capacities are 1,000, 2,000, 3,000 and 4,000 lbs. Higher capacities and special designs for specialized applications.

NEW BROCHURE AVAILABLE . . . describes economics of automatic plate handling, proper applications, typical system layouts, and all NOBLE equipment required. Write for your free copy today; please address Dept. S-4.

3

NOBLE COMPANY

1860 Seventh Street • Oakland 20, California

CALENDAR
OF MEETINGS

Apr. 21-23, Association of Iron & Steel Engineers: Spring conference, Dinkler-Tutwiler Hotel, Birmingham. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Apr. 21-23, Building Research Institute: Annual meeting, Shoreham Hotel, Washington. Institute's address: 2101 Constitution Ave., Washington 25, D. C. Executive director: William H. Scheick.

Apr. 21-23, Metal Powder Association: Annual meeting and show, Sheraton Hotel, Philadelphia. Association's address: 130 W. 42nd St., New York 36, N. Y. Secretary: Kempton H. Roll.

Apr. 21-23, Metal Treating Institute: Spring meeting, Camelback Inn, Phoenix, Ariz. Institute's address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

Apr. 22-24, American Society of Lubrication Engineers: Annual meeting and exhibit, Hotel Cleveland, Cleveland. Society's address: 84 E. Randolph St., Chicago 1, Ill. Administrative secretary: Calvert L. Willey.

Apr. 22-24, Electronic Components Conference: Ambassador Hotel, Los Angeles. Information: George H. L. Norman, Electronic Components Conference, Sprague Electric Co., P. O. Box 66507, 12870 Panama St., Los Angeles 66, Calif.

Apr. 23-25, American Management Association: Special office management conference, Roosevelt Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

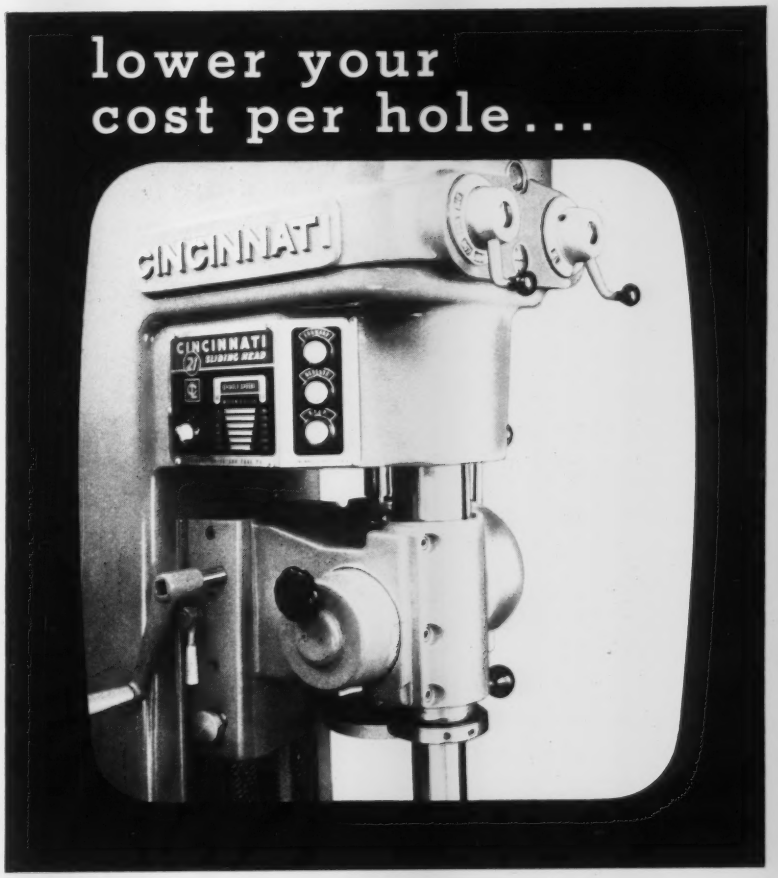
Apr. 24-25, Society for Advancement of Management: Management engineering meeting, Statler Hilton Hotel, New York. Society's address: 74 Fifth Ave., New York 11, N. Y. Executive vice president: Harold R. Bixler.

Apr. 27-May 1, American Ceramic Society: Annual meeting, Penn-Sheraton Hotel, Pittsburgh. Society's address: 4055 N. High St., Columbus 14, Ohio. Secretary: Charles S. Pearce.

Apr. 27-30, Chamber of Commerce of the United States: Annual meeting, Washington. Chamber's address: 1615 H St. N. W., Washington 6, D. C. Executive vice president: Arch N. Booth.

Apr. 27-May 1, Electrochemical Society Inc.: Spring meeting, Statler Hilton Hotel, New York. Society's address: 1860 Broadway, New York 23, N. Y. Secretary: Henry B. Linford.

Apr. 27-May 2, National Association of Architectural Metal Manufacturers: Annual convention, Shamrock-Hilton Hotel, Houston. Association's address: 228 N. LaSalle St., Chicago 1, Ill. Executive secretary: William N. Wilson.



CINCINNATI

Sliding Head Drills

Rugged construction . . . expensive drill features . . . CINCINNATI-quality. And, a moderate price! For a 21" or 25" drill, CINCINNATI is your best buy!

Husky frame and stable spindle assure sustained accuracy for production or toolroom work. Back gear arrangement provides full torque over a wide speed range—with INFISPEED variable spindle speed control, or with conventional drive. A good range of geared power feeds, coupled with direct-reading depth stop, gives maximum productivity. 1½" drilling capacity in cast iron affords wider work range.

Add it all up and you get Lower Production Costs, Minimum Maintenance Expense.

CINCINNATI Sliding Head Drills are built in 21" and 25" models with 1½" drilling capacity; 16" and 24" models with 1" capacity. See your CL&T Dealer, or write us direct.

Improved Machining Through Research

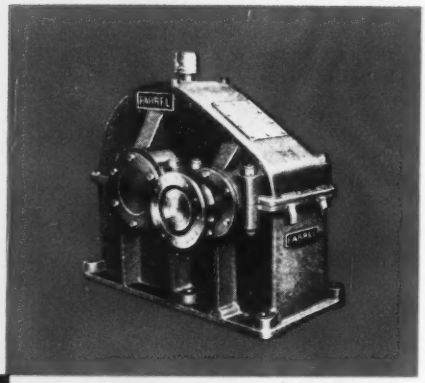
CINCINNATI LATHE AND TOOL CO.

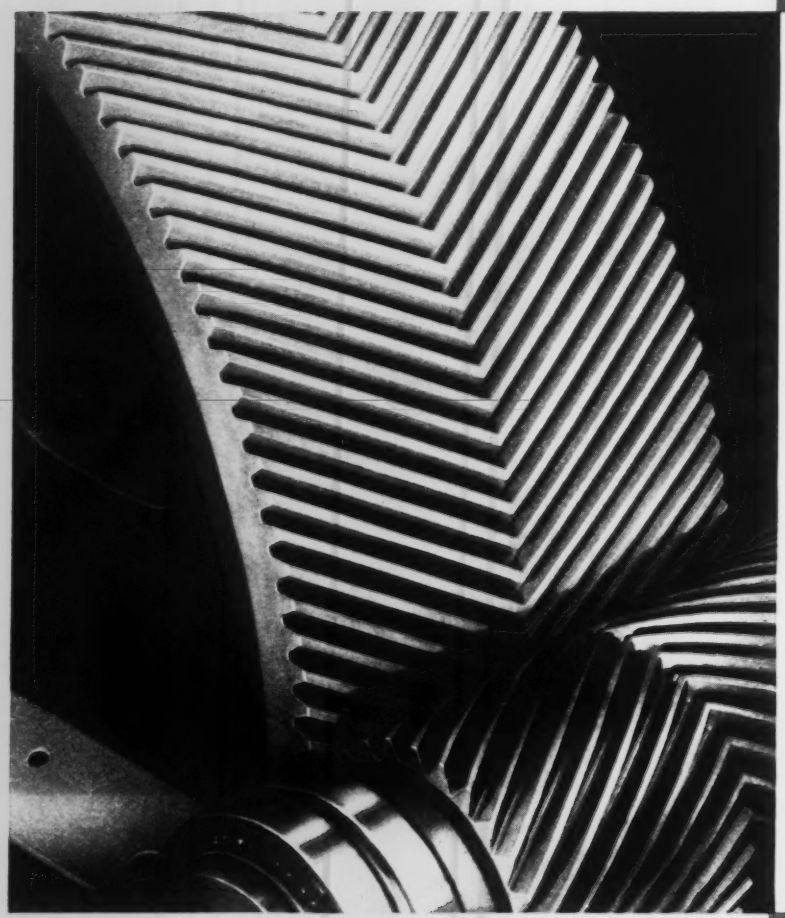
3210 Disney Street • Cincinnati 9, Ohio

"TRAY-TOP" Lathes • "CINCINNATI" Drilling Machines
"SPIROPOINT" Drill Sharpener

Choosing a speed reducer?

Your selection has a finer future with Farrel® precision gearing





Farrel speed reducers offer important advantages for simplifying drive problems and providing vital service continuity.

First, all gearing is precision generated by the well-known Farrel-Sykes method—a process that results in accuracy of tooth spacing, tooth contour and helix angle. Gears are finish-machined on their shafts to insure concentricity of pitch diameters with axes of rotation; pinions are made integral with their shafts. This initial precision reduces wear and prolongs the life of the gears.

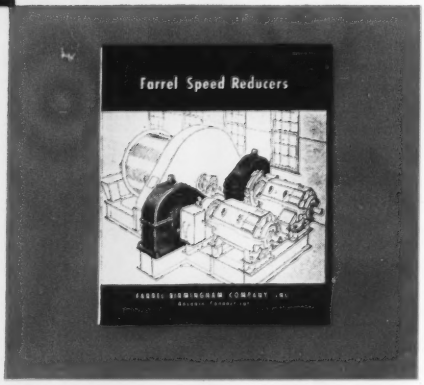
Second, the Farrel line provides broad selectivity in types, capacities, speeds and ratios. This enables you to select the unit which meets your needs exactly.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, Boston, Akron, Ann Arbor (Mich.), Chicago, Minneapolis, Fayetteville (N. C.), Los Angeles, Salt Lake City, Tulsa, Houston
European Office: Piazza della Republica 32, Milano, Italy

Farrel-Birmingham®

FREE BOOKLET, No. 450, gives complete details of the full line of Farrel speed reducers. It includes specifications, horsepower rating tables, overhung load capacities, dimensions and weights. Send for your copy today.



FB-1127

YOUNGSTOWN SHEETS AND STRIP

Speed-Up Toughest Deep-Drawing Operations

Photo and Drawing courtesy of Hydraulic Press Mfg. Co.

Modern high-speed precision drawing and stamping operations require only the highest quality steel if top production - low reject rates are to be maintained on difficult-to-run parts. And the highest quality steel produced anywhere is Youngstown Sheets and Strip.

Our satisfied customers, across the nation, tell us time and time again: "Our production is increasing—Rejects falling off—Fabrication costs are down." Why not make Youngstown your regular sheet and strip specification from now on—for improving both product quality and the overall profit picture.

When you use Youngstown Sheets and Strip you can be sure metallurgical quality will never vary because they are produced by steelmakers—with over 56 years experience—using only the most scientific quality control techniques. This guarantees a proper blending of the required ductility, tensile strength, flatness and surface to meet **your** exact specifications.

Why not call or write your nearest Youngstown District Office, today, for metallurgical assistance or additional information—or write directly to our Home Office.

QUALITY YOUNGSTOWN SERVICE

COLD ROLLED SHEETS AND STRIP

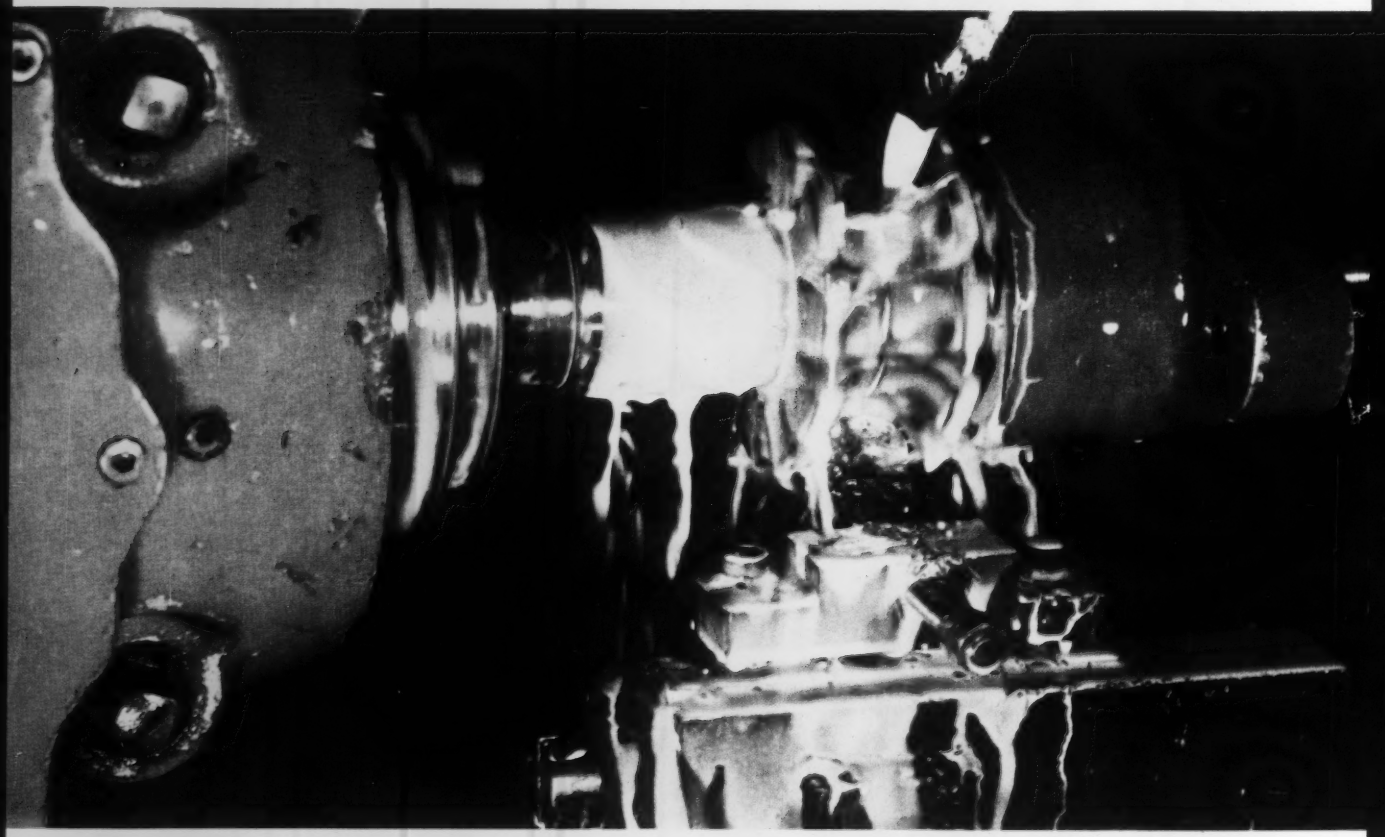
THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities

Wheels and machines stay cleaner with emulsions of new S.E.C.O. Also, finishes are better.



Emulsions of new S.E.C.O. allow faster cuts with less tool wear.

Photos courtesy of Peter Salmon Co., Glenside, Pa.

NEW EMULSIFYING OIL KEEPS MACHINES CLEAN, PROTECTS AGAINST RUST, GIVES IMPROVED HARD-WATER EMULSION STABILITY

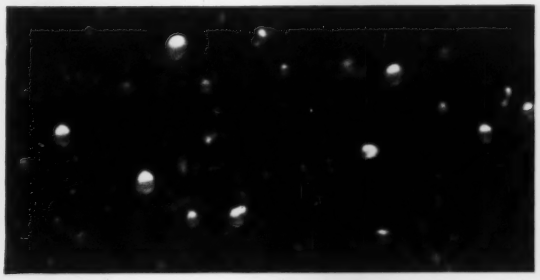
Emulsions of Sun's new S.E.C.O. (Sunoco® Emulsifying Cutting Oil) with smaller oil particle size give you the following benefits—

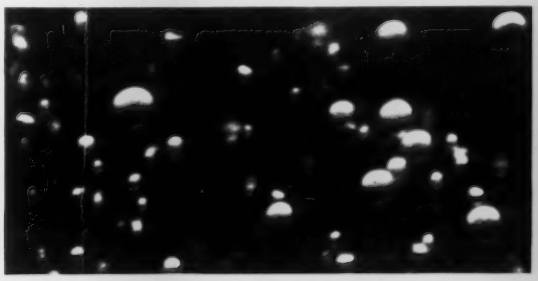
EMULSION STABILITY—In hard-water areas, impartial field tests show that emulsions of *new* S.E.C.O. stand up better under more severe conditions than those made with other regular emulsifying cutting oils.

DETERGENCY—The excellent wetting properties and detergency of *new* S.E.C.O. allow dirt and fines to settle quickly out of emulsions. Grinding wheels and machines stay cleaner.

RUST-PREVENTION—The smaller oil particle size in emulsions of *new* S.E.C.O. gives better metal wetting properties and increased protection against rust and corrosion. See photos below.

If you're a regular user of S.E.C.O., notice how much it has been improved. If you're not, find out what we mean about greater economy and improved production with *new* Sunoco Emulsifying Cutting Oil. Call your Sun representative, or write to Sun Oil Company, Philadelphia 3, Pa., Dept. I-9.





800x photomicrographs of 10% emulsions. *New* S.E.C.O. emulsion on left contains *8 times* as many oil particles per unit volume as ordinary emulsion on right. Many minute particles in S.E.C.O. emulsion do not show at this magnification.

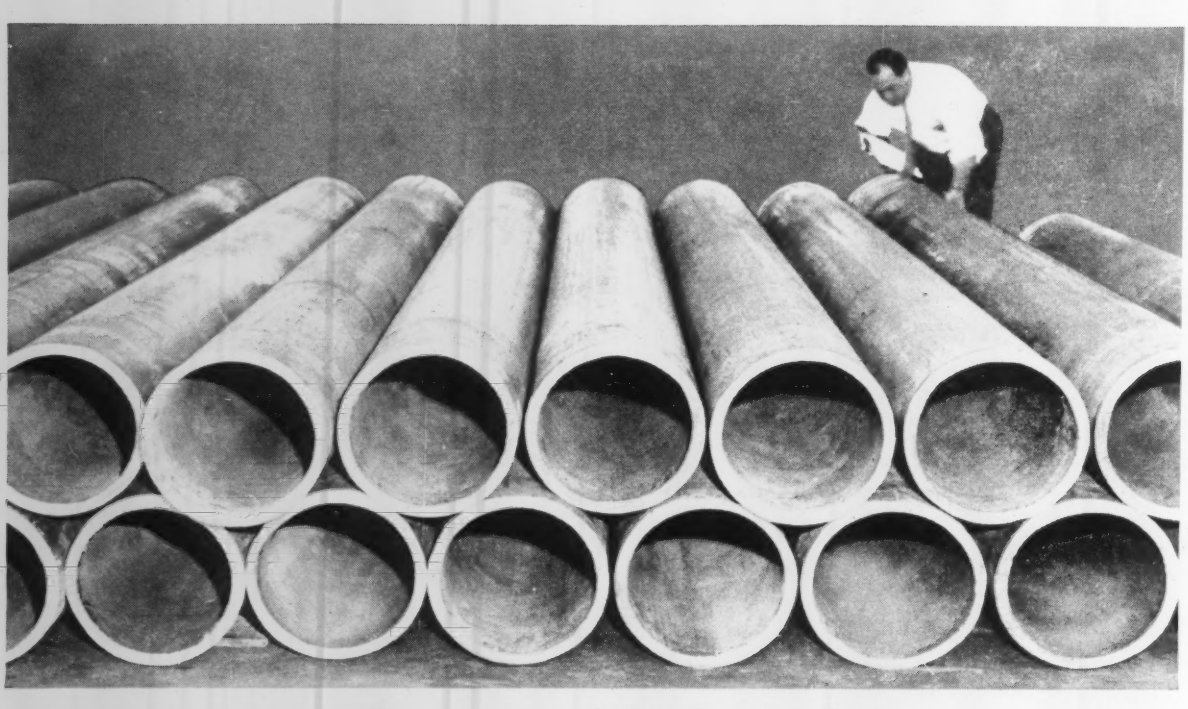
SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

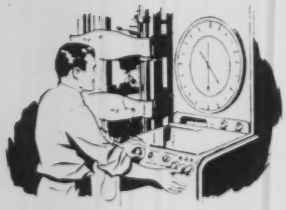
SUN OIL COMPANY Philadelphia 3, Pa.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

©Sun Oil Co., 1958

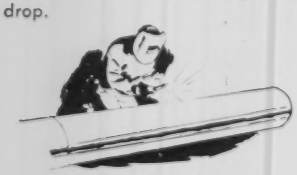


Premium quality extruded steel pressure tubing at standard prices



Transverse Strength, 30% to 50% higher than conventional, withstands higher internal pressures.

Improved Internal Finish offers less resistance to flow — reduces pressure drop.



Fewer and Faster Field Welds, due to close concentricity and uniform wall thickness. 50-foot lengths require fewer joints, reduce welding costs 50-60%.

High performance Chrome-Moly Alloy extruded steel pressure tubing *... in diameters from 14" to 18" o.d. ... in standard wall thicknesses ... in lengths from 20 to 46 feet* ... is now available *from stock* for immediate delivery at standard prices.

Other diameters, of Chrome-Moly and Austenitic Stainless, ranging from 10" to 20" with wall thicknesses ½" to 5¼" and in lengths up to 50 feet, are available on a four-month delivery schedule.

The unusual properties of this extruded tubing, such as exceptionally high transverse strength, impact strength and ductility, make it ideally suited to high-temperature, high pressure applications in the power, petrochemical, food processing and other process industries.

Contact our nearest distributor or district office. Experienced application engineers are available for consultation.

Complete Engineering and Processing Services for: ***Extrusions • Castings Forgings • Machining***

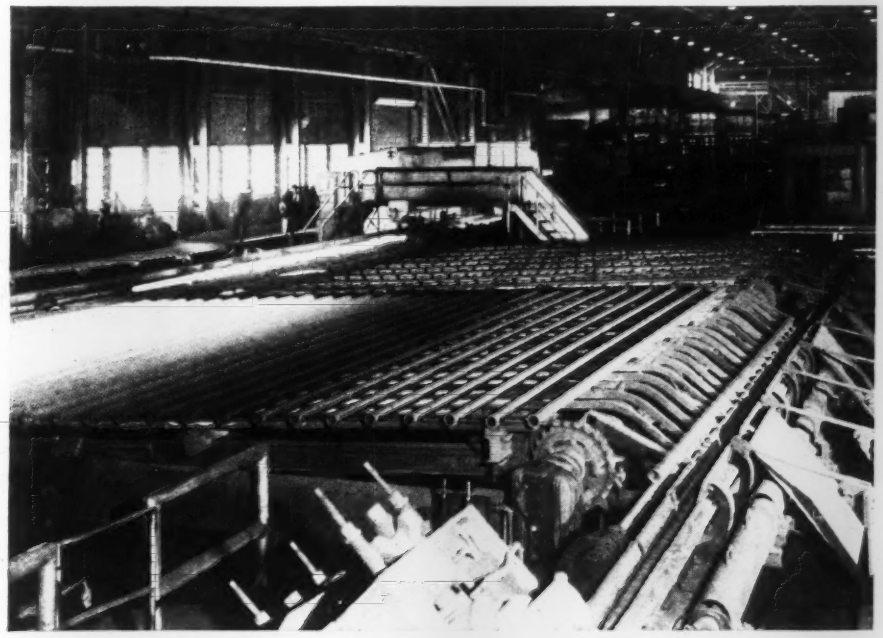
METALS PROCESSING DIVISION

CURTISS-WRIGHT

CORPORATION • 80 GRIDER ST. BUFFALO, N.Y.

Distributors: Capitol Pipe & Steel Products, Philadelphia, Penna. • Tube Sales, Los Angeles, California • ***District Offices:*** Chicago, Illinois, 208 South LaSalle Street • Wood-Ridge, New Jersey, Main and Passaic Streets • North Hollywood, California, Van Owen & Vineland • Dayton, Ohio, 131 North Ludlow Street • Export Division, 50 Rockefeller Plaza, New York, N. Y. • Montreal, Quebec, Canada, 1980 Sherbrooke Street, West.

Many metal working operations need the extra qualities of Promal chain



LINK-BELT H CLASS PINTLE CHAIN with pusher attachments on this pipe cooling rack designed by Aetna-Standard Engineering Co. receives white-hot pipe from finishing operations in a continuous butt weld mill. Controlled chain speed permits uniform cooling of outer tube periphery.

Specially heat-treated malleable iron resists heavy and abrasive loads

Fewer conveyor shutdowns and minimized replacements are economies realized by users of Link-Belt Promal chain. Promal will withstand repeated cyclic hearing up to 1000° F. Its greater strength absorbs continuous impact loads, and high wear resistance supplies the durability to cope with severe abrasion.

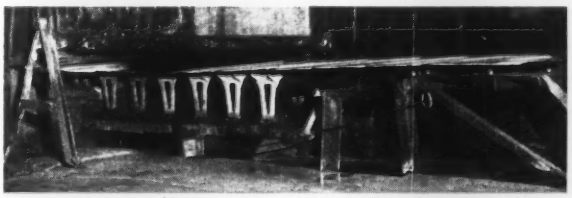
A Link-Belt Development

Promal is more than a partially annealed or surface-hardened malleable iron. Developed by Link-Belt, this specially heat-treated malleable iron is actually transformed into a metal of radically different physical properties. Promal, because of uniform microstructure throughout its whole section, provides greater ultimate strength, higher yield point, exceptional fatigue resistance.

Where and how to apply Promal in the metal working industry

Choose Link-Belt Promal chains for highly abrasive or heat-conditions—for extra strength and wear resistance demanded by heavy loads or long sliding conveyors. They last much longer . . . cost but a little more.

The wide range of Link-Belt chains available in Promal includes all types of cast and combination chains.



SMGL-618 PROMAL chain conveyor is another example of the applicability of heat-resistant Promal in the metal working industry. This chain conveyor with special joint design and riser attachments picks up and conveys sheet steel through furnace. Chain has operated continuously for two years without failure. The heat-resistant properties of Promal also make it a desirable material for use on low-temperature heat-treating equipment.

PHYSICAL PROPERTIES OF PROMAL

Compare this with other ferrous materials used for chain applications.

Yield Point	55,000 pounds per sq. in.
Ultimate Strength	75,000 pounds per sq. in.
Fatigue Strength	35,000 pounds per sq. in.
Elongation	10 to 14% in 2 inches
Average Brinell Hardness	170 to 190

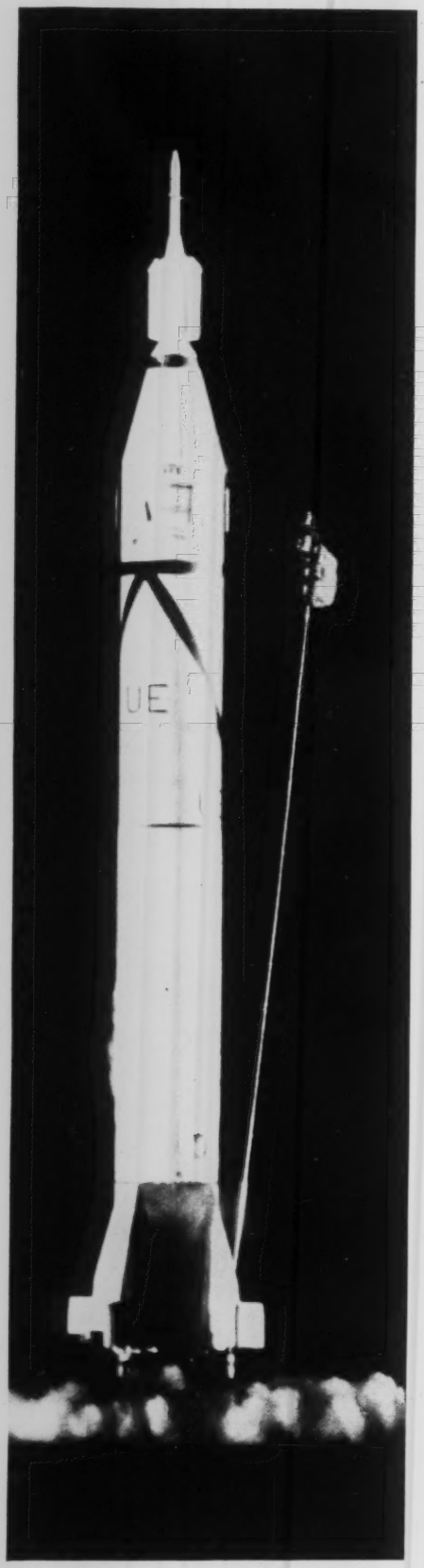
PROMAL'S high strength factors make it ideal for the especially long elevators and conveyors employed in the metal working industries.

HEADQUARTERS for Link-Belt products is your nearby Link-Belt factory branch store or authorized stock-carrying distributor. Refer to the yellow pages of your local phone directory.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13), Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,823



Republic Stainless Steel Circles the World

When "Explorer I" was successfully placed in orbit by the U.S. Army from Cape Canaveral on January 31, a new era was opened for the use of Republic ENDURO® Stainless Steel.

Vital instruments in the nose section of the satellite are protected by a cone of stainless steel produced by Republic. This nose cone was fabricated from Type 430 by The Lodge and Shipley Company, Cincinnati, Ohio, using the Floturn Process. By flow-turning, the wall thickness of the cone can be increased in specific areas to comply with design requirements of high temperatures or stresses.

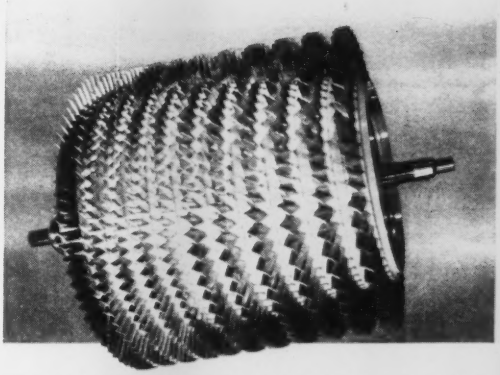
Stainless Steel is highly ductile. It is readily formed into desired shapes by cold-forming, drawing, and bending operations. It provides low thermal expansion and is highly resistant to atmospheric corrosion, erosion, and oxidation at high temperatures.

Republic is the world's largest producer of stainless, heat-resisting, and alloy steels. As rapid developments in the fields of supersonic aircraft and missiles increase demand for these high-strength, select formula steels, Republic is keeping pace through research and new production facilities.

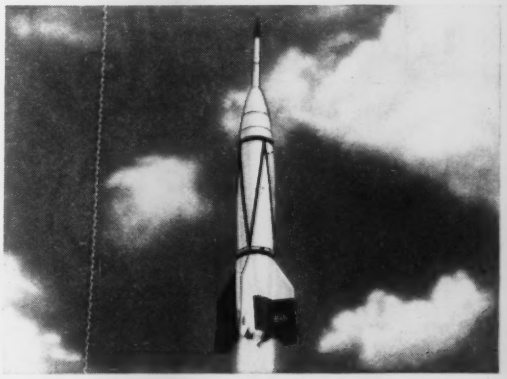
Our metallurgists and engineers are always available, without obligation, to work with your personnel in using Republic Stainless Steels, Heat-Resisting Steels, Alloy Steels, and Titanium to best advantage. Check and mail the coupon if you would like a Republic specialist to call at your plant.

Official U.S. Army photograph shows launching of Jupiter-C Missile and "Explorer I" Satellite from Cape Canaveral, Florida, 10:48 PM, EST, January 31, 1958.

"Explorer I" is positioned on spin launcher. The satellite is spin-stabilized in much the same manner as a rifle bullet. Rotational spin of more than 700 RPM was started on the ground before the satellite was launched. In this Official U. S. Army photograph, the striped area at the top of the Explorer indicates the nose cone fabricated from Republic ENDURO Stainless Steel, Type 430.



REPUBLIC ALLOY STEEL provides high strength and dependable toughness in jet engine compressor rotor discs. In Pratt & Whitney's J-57 jet engine, Republic Hot Rolled Alloy Steel, AMS 6415 (AISI 4340), furnishes the highest strength values—plus an exceptionally high strength-to-weight ratio that permits the design of thinner, lighter sections to save weight and hold down size without sacrifice of strength or safety. The discs are machined from forgings by the Jet Division of Thompson Products, Inc. Forgings are supplied by Wyman-Gordon Company.



REPUBLIC TITANIUM is currently being used for many applications in both aircraft and missiles. Because of its high strength and weight saving factors, titanium has replaced other materials normally used for firewall and nacelle construction. In missiles and rockets it has almost unlimited applications. Titanium's extremely high corrosion-resistance makes it attractive for tanks to hold acids used in combination with missile fuels. Nitric acid, for example, has negligible effect on titanium. It is practically immune to salt water and sea air corrosion. Send coupon for more facts.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

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1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Have a metallurgist call.
☐ Stainless Steel ☐ Alloy Steel ☐ Titanium
Send more information on:
☐ Stainless Steel ☐ Alloy Steel ☐ Titanium

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Company_____
Address_____
City_____ Zone____ State_____

Ruggedly Built for Power and Accuracy

CLEVELAND KNUCKLE JOINT PRESS

Massive and carefully fitted knuckles operating on shafts of hammered steel forgings provide the powerful squeeze on the metal required in coining, cold-forming, extruding, embossing, heavy stamping, sizing and heading operations which Cleveland Knuckle-Joint Presses perform so efficiently, economically.

Greater accuracy of production is assured with these Cleveland Presses due to the long slide bearing surfaces and rugged frame construction which controls slide deflection to a minimum even under maximum load.

Cleveland Knuckle Joint Presses can be supplied in a wide range of sizes with capacities from 150 to 2500 tons and bed areas from 18 x 18″ to 50 x 54″.

Write today for Catalog K2 describing our complete line of Knuckle Joint Presses.

AA-7244

OTHER CLEVELAND PRESSES

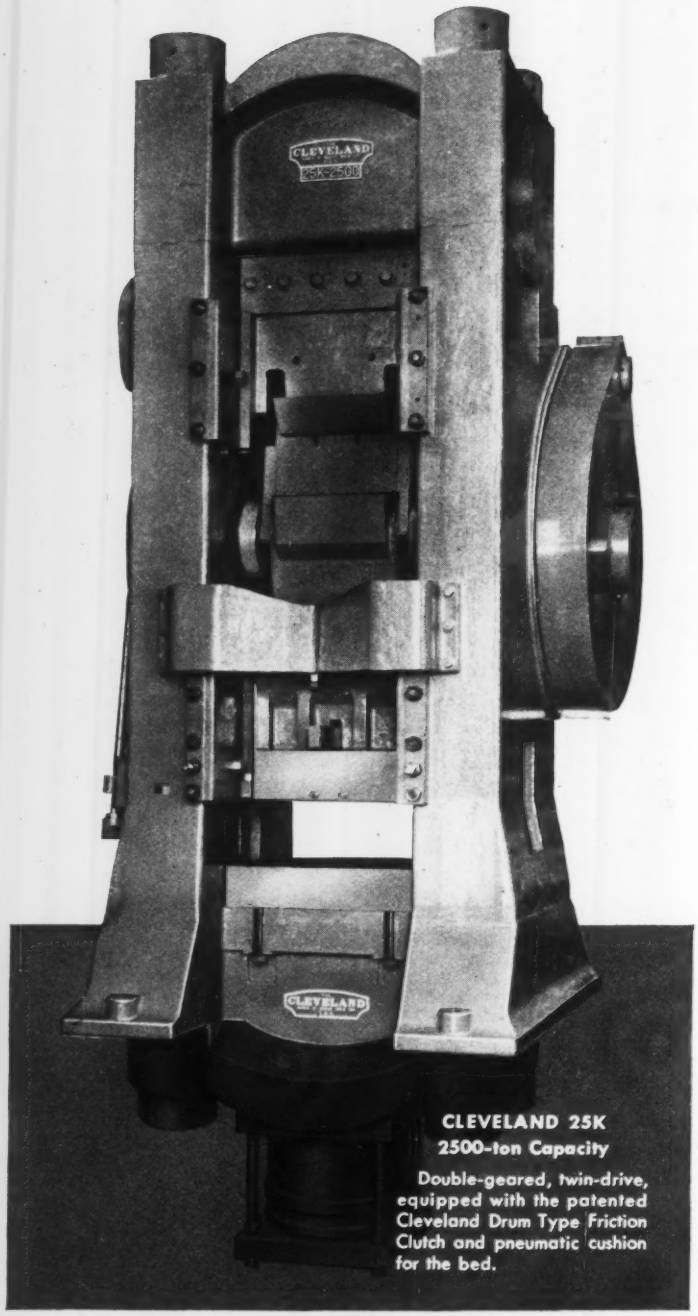
INCLINABLE • HORNING • TRIMMING
STRAIGHT SIDED CRANK • OPEN BACK GAP
STRAIGHT SIDED ECCENTRIC • FORGING
DOUBLE ACTION TOGGLE • 4-POINT UNDERDRIVE

THE CLEVELAND PUNCH & SHEAR WORKS CO.
Established 1880

Power Presses
Fabricating Tools
Punching Tools & Dies

E. 40th and St. Clair Avenue, Cleveland 14, Ohio

Offices: NEW YORK, DETROIT, CHICAGO, PHILADELPHIA, EAST LANSING, CINCINNATI



CLEVELAND 25K
2500-ton Capacity

Double-geared, twin-drive, equipped with the patented Cleveland Drum Type Friction Clutch and pneumatic cushion for the bed.

Ingersoll Steel Deliveries

TIMED TO YOUR PRODUCTION

Here at Ingersoll Steel we knock ourselves out to give you on-time, as-promised delivery of a wide variety of special purpose steel sheets and plates. The minute your order is received it starts getting the V.I.P. treatment—and that's the way it goes all the way to your receiving department.

Being a specialty mill, we can and do adjust our production schedules to dovetail with your production needs. And with our advantageous central location at New Castle, Indiana, prompt deliveries are assured. Next time you need any of the products listed below, call Ingersoll Steel and you'll see what we mean.

Ingersoll Produces:

STAINLESS STEELS • HEAT RESISTING STEELS • INGACLAD STAINLESS-CLAD SHEETS • ALLOY STEELS • FORGING QUALITY ELECTRIC STEEL INGOTS • AUTOMOTIVE CLUTCH PLATE STEELS TEM-CROSS CROSS-ROLLED STEEL • CARBON ELECTRIC STEEL FOR TRACTOR CLUTCH DISCS • KNIFE STEELS • SAW STEELS HIGH SPEED HACK SAW STEELS • SOFT CENTER AND OTHER AGRICULTURAL STEELS • SPECIAL ANALYSIS STEELS

INGERSOLL STEEL B-W BORG-WARNER ®

Ingersoll STEEL DIVISION

Borg-Warner Corporation

New Castle, Indiana

Maybe you're paying

for top quality "Commercial Grade" Roller Bearings...BUT ARE YOU GETTING THEM?

Cutaway view of Rollway Tru-Rol® segmented-retainer roller bearing ... one of three distinct types of Tru-Rol bearings available.

True, there's a wide difference in quality and cost between the low-range and high-range of any "commercial grade" bearing. But every Rollway Tru-Rol "commercial grade" bearing approximates as closely as possible maximum standards of construction consistent with the price.

Take the matter of separators, for example. In Rollway bearings, separators give maximum guidance to each roller. The result is greater total load capacity and longer life.

Equal spacing of rollers means uniform distribution of load. The result is the elimination of destructive "pulse" and vibration.

Moreover, separators are of deep section, formed to the curve of the rollers, giving true axial alignment, smooth-surface contact and an even lubrication film on each roller.

It's little things like these that mount up to big savings in service. Check the accompanying list, or ask a nearby Rollway Service Engineer to explain in detail the quality you should be getting in your "commercial grade" bearings. No cost. No obligation. Just write us. Rollway Bearing Co., Inc., 386 Seymour St., Syracuse, N. Y., *manufacturers of a complete line of radial and thrust cylindrical roller bearings.*

ENGINEERING OFFICES: SYRACUSE • BOSTON • CHICAGO • DETROIT • TORONTO • PITTSBURGH • CLEVELAND • MILWAUKEE • SEATTLE • HOUSTON • PHILADELPHIA • LOS ANGELES • SAN FRANCISCO

Check This List AND BE SURE!

Retainer Operation

☐ Is the retainer roller-supported, to reduce sliding friction?

Retainer Construction

☐ Is the retainer strong enough to withstand shock loads and sudden reversals?

(A Rollway segmented-type steel retainer, such as that illustrated, is the strongest, most durable available in commercial grade bearings.)

Roller Spacing

☐ Are all rollers equally separated, or do some rub against each other in opposed-motion friction?

☐ Are rollers distributed evenly to prevent "pulse" and vibration?

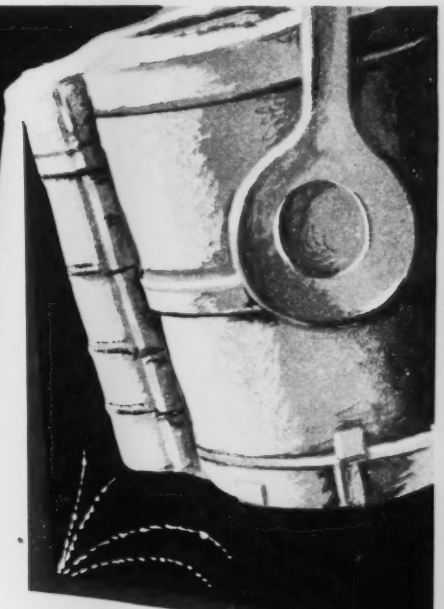
Roller Construction

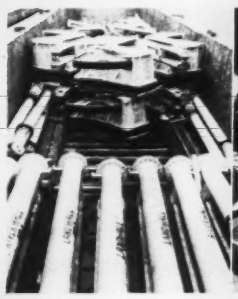
☐ Are the rollers crowned for optimum load distribution?

For Top Quality in Every Detail Buy Tru-Rol and Be Sure!

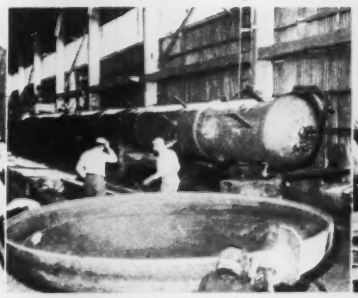
AVONDALE

is equipped to give you product versatility in steel

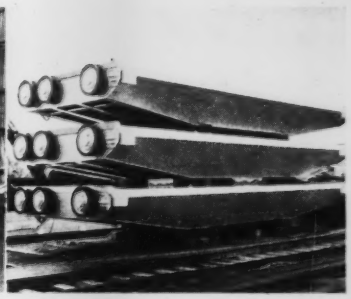




River lock gates built by Avondale.



Nickel lined tanks manufactured for the chemical industry.



Operating machinery for a dam project.

Avondale has both standard and large capacity production tools, plus the *ability* to manufacture a wide range of steel products with precision and efficiency. The quality and variety of work performed reflects that rare combination of engineering talent and experience required for outstanding service to all types of industry.

Call, write or wire the Industrial Contracts Division of Avondale for a complete set of brochures illustrating our capabilities in steel.
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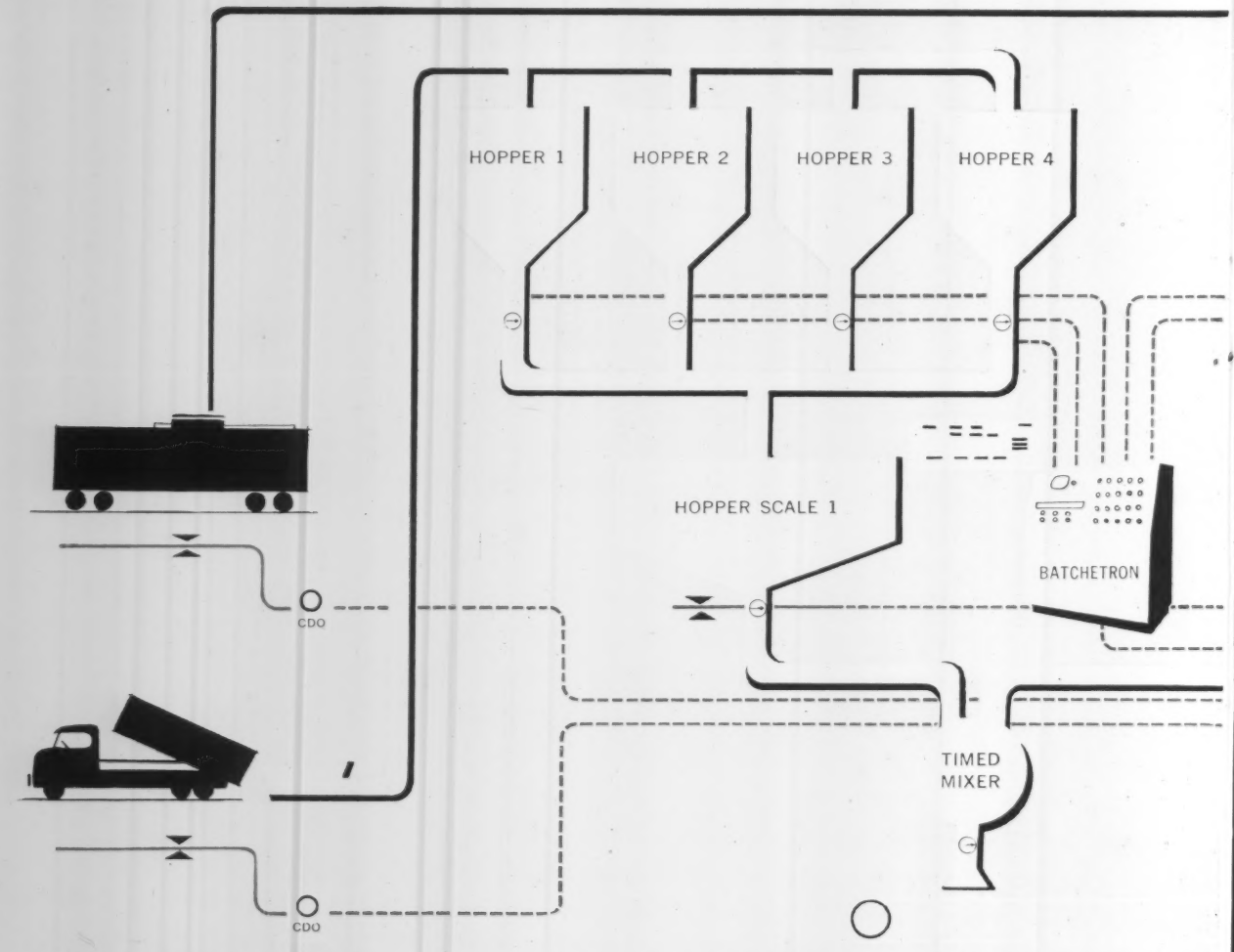
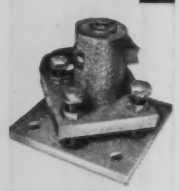
AVONDALE MARINE WAYS, INC.

CABLE ADDRESS "AVONWAYS"

P. O. BOX 1030 • PHONE UNiversity 6-4561 **• NEW ORLEANS 8, U. S. A.**



METER···MANAGE···MONITOR

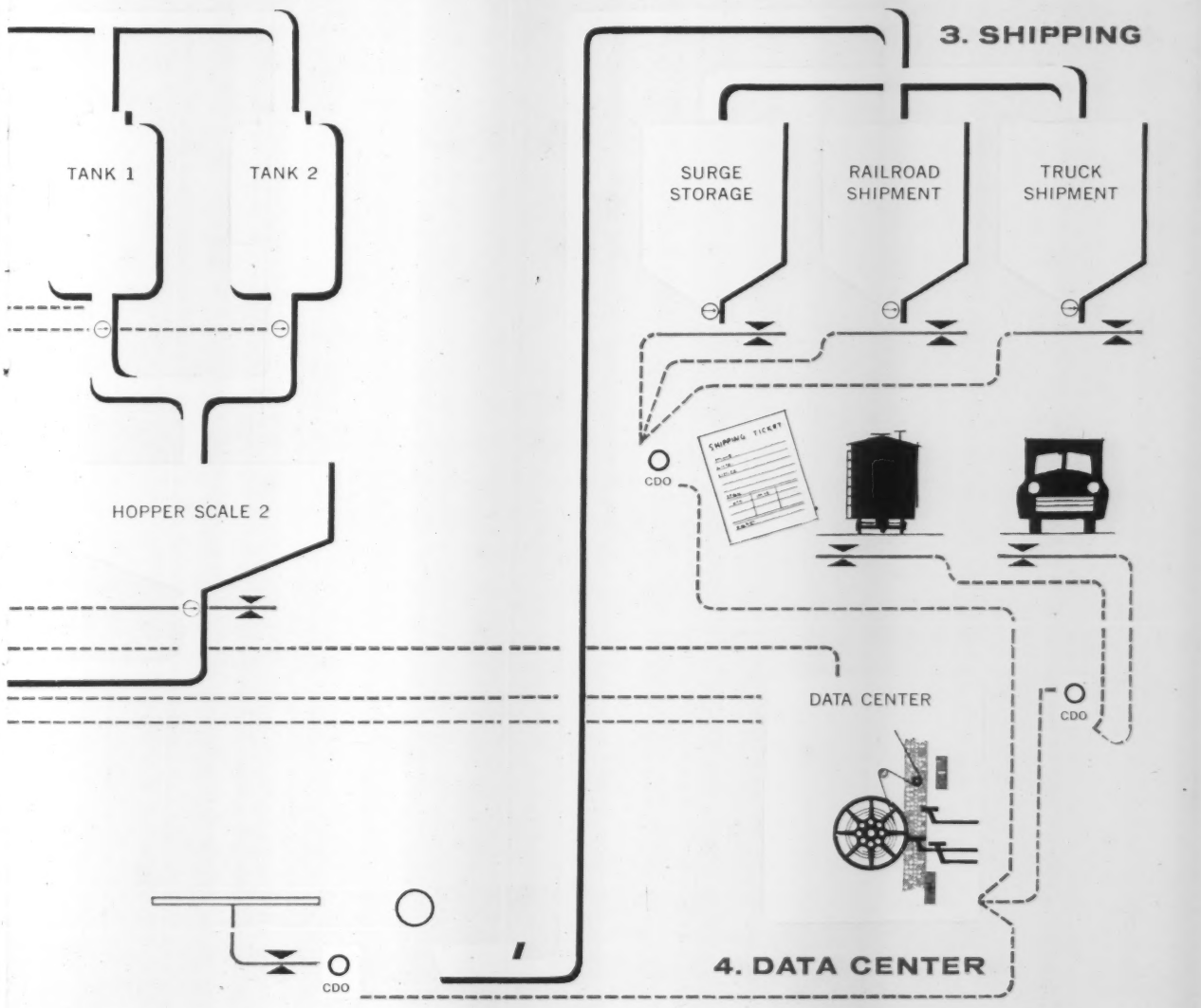


Electronic Load Cell

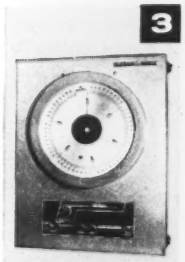
1. Starting with receiving of all raw materials, liquid and bulk, Fairbanks-Morse electronic process control can put your entire operation on a closely supervised basis—automatically. Weight data can be continually fed to current inventory records. Low supply level of any or all raw materials can automatically signal reorder requirements.

F-M Control Console

2. Flexible F-M control systems can be "fitted" to your requirements. You have widest selection of programming techniques—punched-card, tape, push-button, etc. Fully interlocked, the system is completely safeguarded against mechanical or human errors such as "double" or "off-spec" batching. Cycle of operations is easily adjusted or revised.

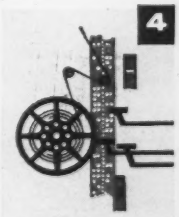


with F-M ELECTRONIC PROCESS CONTROL



Visual and Printed Read-Out

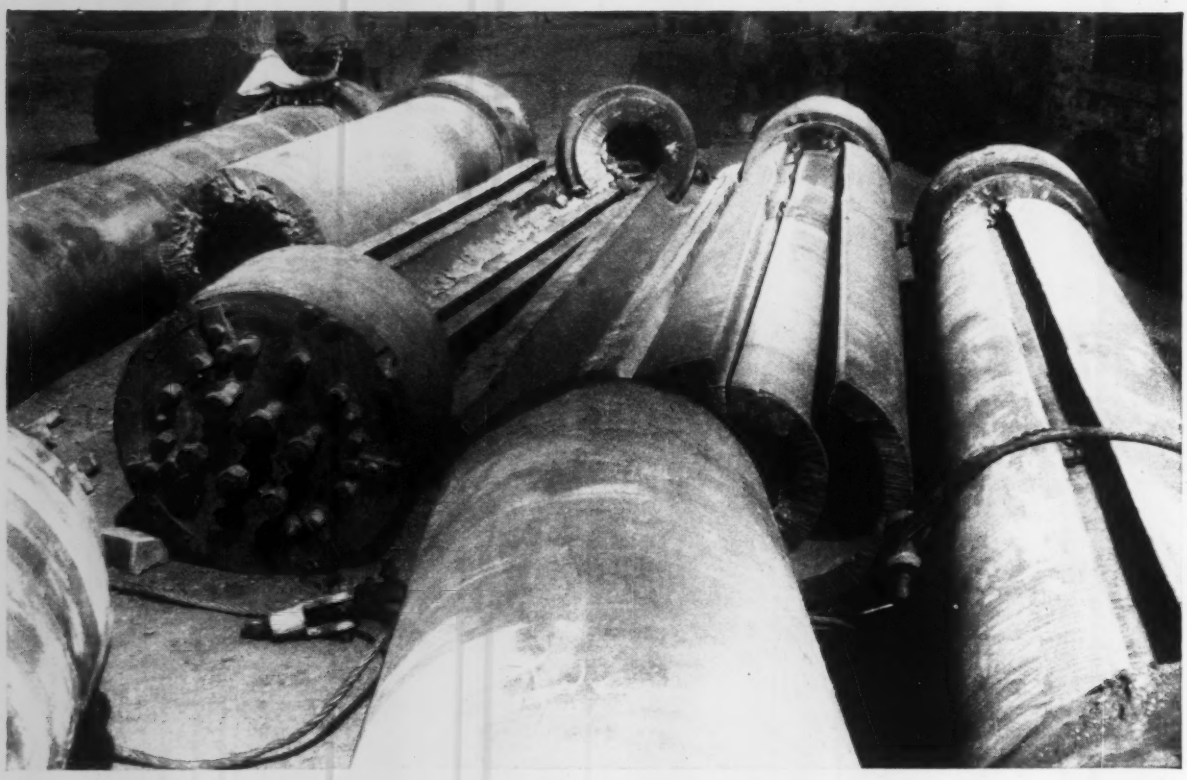
3. Throughout receiving, processing and shipping cycles you can establish visual and/or printed digital read-out stations, maintaining all the advantages of full information in every department. Each shipment can generate its own shipping weight ticket as it arrives on the shipping dock.



4. Every item of variable cost... profit ...can be instantly determined as data are fed automatically from all points in the F-M control system to centrally located automatic typewriters, adding machines, billing machines and computers. F-M has the equipment, experience and the proven ability to automate your operations on a turn key basis.

FAIRBANKS-MORSE
a name worth remembering when you want the BEST

FOR FREE AUTOMATION FEASIBILITY STUDY, WRITE: FAIRBANKS, MORSE & CO., CHICAGO, ILLINOIS



Mechanized Cutting Speeds Scrapping of 95-Ton Pressure Vessels

Scrapping huge pressure vessels loomed as a costly, time-consuming job for a large scrapyard in Birmingham, Alabama. But mechanized oxygen-cutting quickly cut this job down to size—and with substantial savings in labor and materials.

The versatile OXWELD CM-45 Portable Cutting Machine teamed up with a C-56 Blowpipe to slice through 8-in. thick laminated steel walls at a speed of 4 to 5 in. per minute. Two 24-ft. cuts were made in each vessel in less than two hours' time. Transverse cuts were then made to reduce these sections to charging-box size.

Today scrapyards, fabricators, and maintenance shops everywhere are slashing costs with the speed and efficiency of mechanized oxygen-cutting.

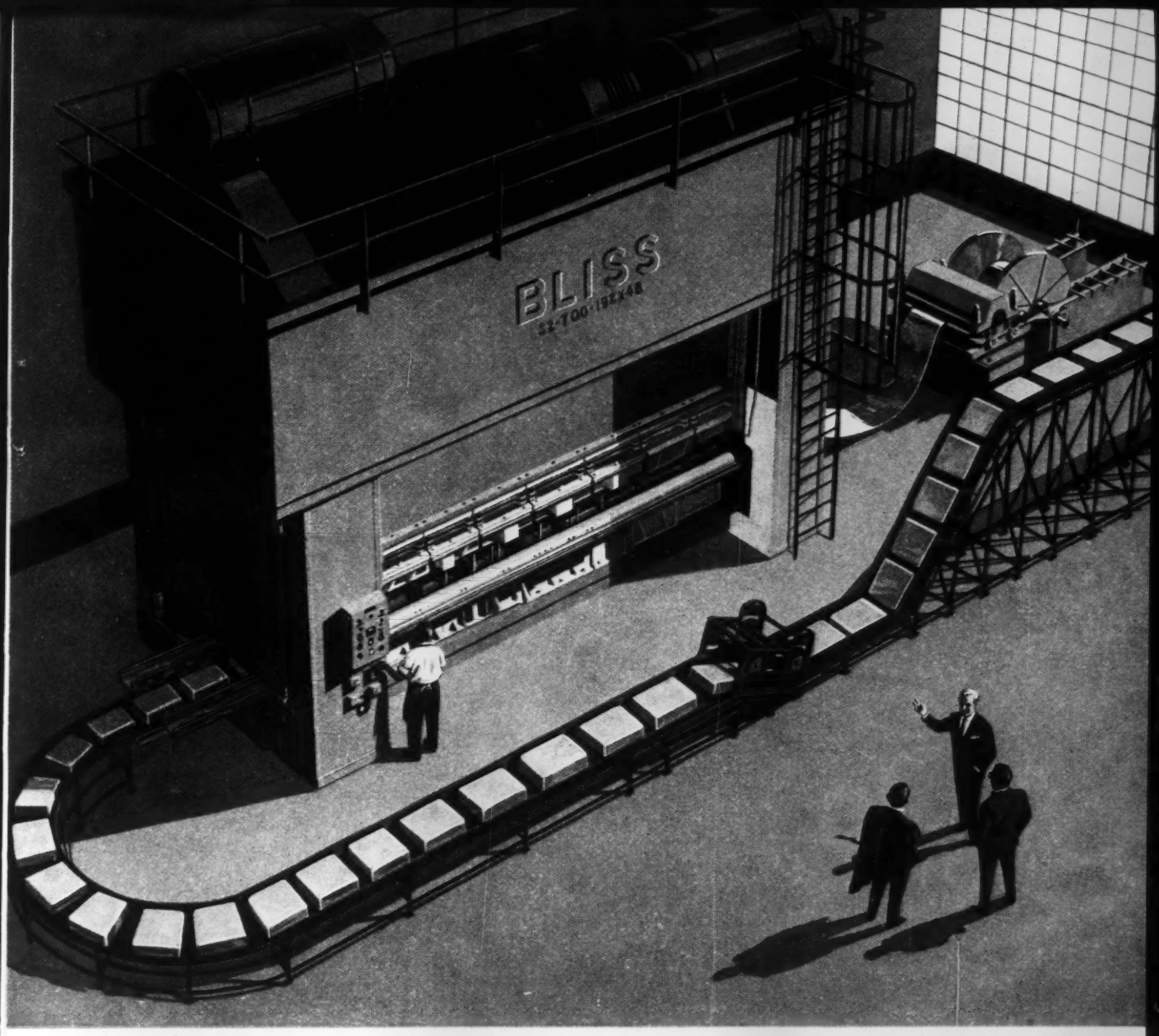
See how you, too, can save. Ask your nearby LINDE representative to show you the *complete* line of dependable OXWELD Portable Cutting Machines—or write for free catalog F-4487. Do it today!

LINDE COMPANY

DIVISION OF UNION CARBIDE CORPORATION

30 East 42nd Street, New York 17, N. Y.

"Linde," "Oxweld," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.



"We get ten refrigerator pans a minute...

from one press and with one attendant!" From its motorized coil cradle to its mechanized conveyer, this is a truly automated production unit. Coil stock feeds through the press' seven transfer stations... is easily formed and drawn into deep drawn refrigerator pans. Bliss engineers design and build entire systems like these, including the dies.

Can a transfer feed press work for you? Best way to find out is to ask—ask the people who introduced them in the nineties and have pioneered in their improvement since.

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SINCE 1857

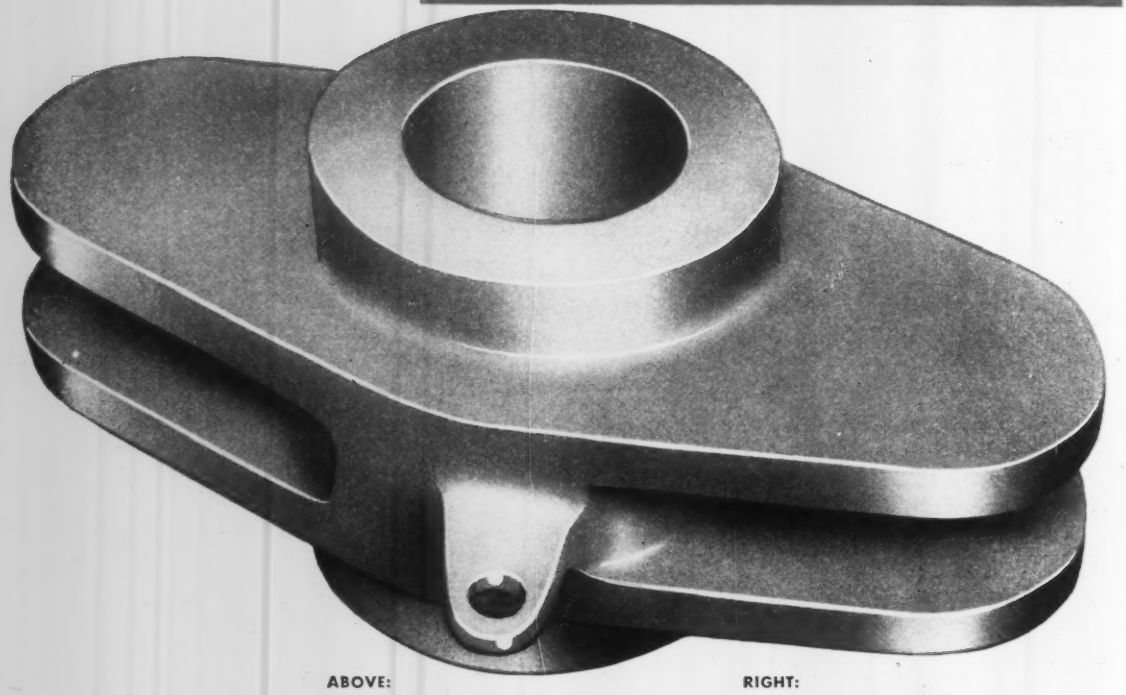
E. W. BLISS COMPANY · Canton, Ohio

BLISS is more than a name... it's a guarantee

PRESSES • ROLLING MILLS • ROLLS • DIE SETS • CAN MACHINERY • CONTRACT MFG.

BEFORE YOU SAY . . .

"IT CAN'T BE CAST"



ABOVE:

Automatic Winch brake pawl carrier.

Previous cast weldment required costly machining. ESCO Shellcasting eliminated major machining and effected considerable savings.

RIGHT:

Transmission Shifter Fork.

As formerly cast the fork tip pads posed difficult alignment problems during machining. ESCO Shellcast made possible the casting of the fork tip pads to size and in alignment, eliminated machining, reduced the unit price.

CALL AN ESCO ENGINEER

ESCO alloy steel castings can make your designing *easier.* You get the part you want, in the alloy you need and in the shape that saves you the most fabricating, machining and finishing time.

PLUS METALLURGICAL ENGINEERING AND RESEARCH

ESCO maintains one of the largest and best equipped metallurgical staffs of any alloy steel foundry —

PLUS PRODUCT ENGINEERING AND DESIGN

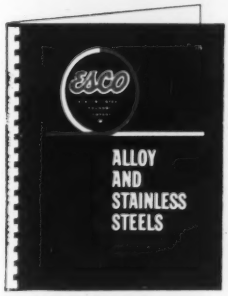
An integrated service at all levels; in the field, at the drawing board and in the foundry —

PLUS FOUNDRY FACILITIES AND CASTING EXPERIENCE

A casting service that covers the complete range of alloy steel casting methods of all applications —

PLUS LABORATORY INSPECTION AND TESTING

ESCO laboratory technicians are qualified and equipped to perform all types of inspections and testing to the most rigid specifications.



Write today for your FREE copy of this informative 100-page reference book, "ESCO Alloy and Stainless Steels for the Process and Manufacturing Industries"

Call an ESCO Engineer—let him show you how ESCO Alloy Steel Castings make your designing easier.

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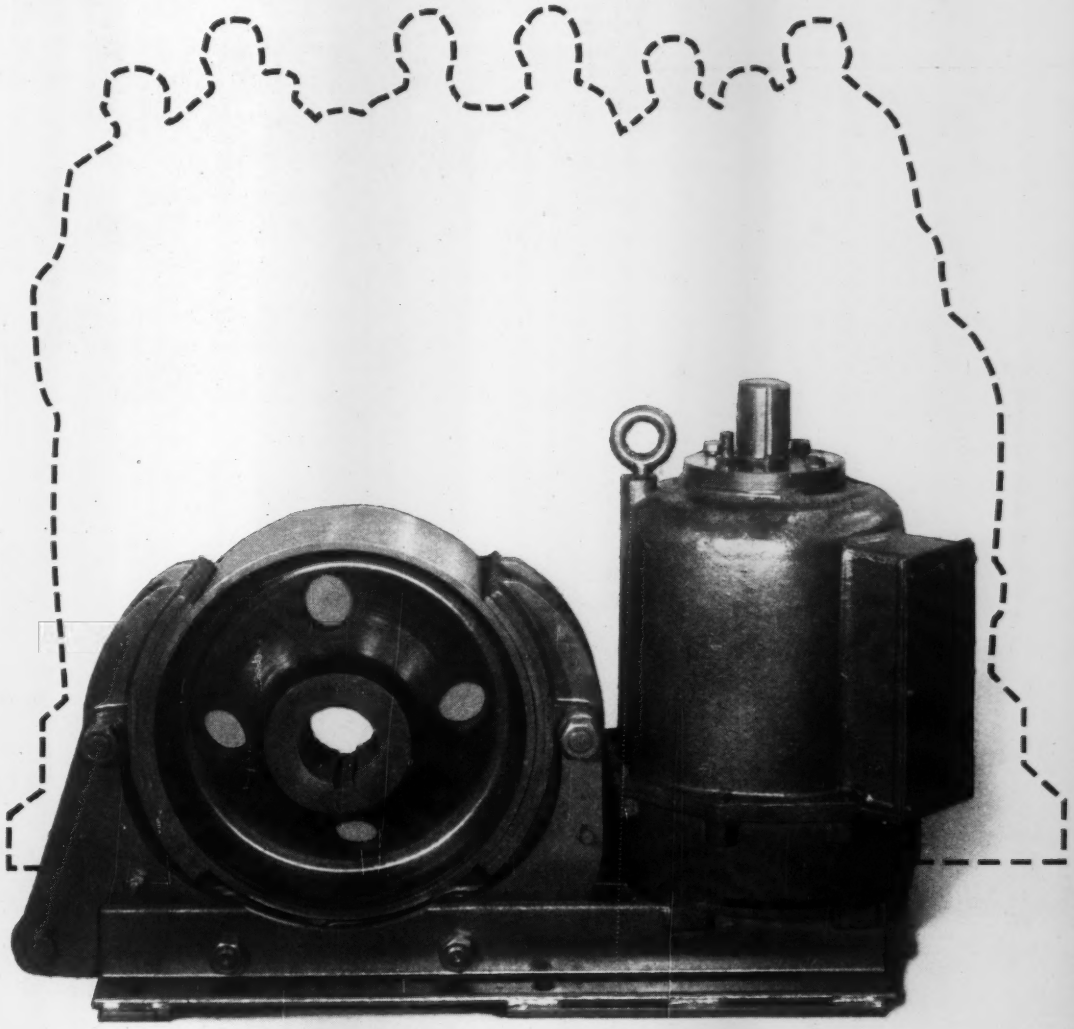
MFG. PLANTS AT PORTLAND, ORE. AND DANVILLE, ILL.
Offices in Most Principal Cities
ESCO INTERNATIONAL, NEW YORK, N. Y.
IN CANADA ESCO LIMITED

Ordinary d-c magnetic brakes require an average of 24 man-hours per year to maintain proper brake adjustment but...



J-22115

Westinghouse d-c magnetic brakes adjust themselves automatically... save you all this maintenance cost... approx. $60.00 per year per brake.

YOU CAN BE SURE...IF IT'S Westinghouse

Photo courtesy of Jones & Laughlin Steel Corporation

BAKER'S MAGDOLITE AND JEBCOLITE
are always 5 ways better

Continued research and development throughout the years, plus The J. E. Baker Company's precisely controlled manufacturing methods, have resulted in the superior, properly burned, grain-sized Magdolite and Jebcolite particles which help provide:

More uniform ingots—increased ingot production—increased furnace efficiency—lower refractory costs—less defective production material.

Magdolite and Jebcolite* are the *original* dead-burned dolomites that offer better composition, preparation, strength, economy and quality. Don't say "dolomite." Save dollars. Specify Baker's Magdolite for open hearth and Jebcolite for electric furnace use.

** Jebcolite has the same superior chemical, physical and mineralogical characteristics as Magdolite and differs only in grain size which is designed specifically for electric furnace application.*

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PRODUCTS
SINCE 1889

THE J. E. BAKER COMPANY
YORK, PENNSYLVANIA
PLANTS: BILLMEYER, YORK, PENNSYLVANIA — MILLERSVILLE, OHIO

Tubexperience in action

Superior weighs a wall to "zero in" on your tubing tolerance

Weight control gives precise check of tubing dimensions to help your product performance

*These delicately balanced scales weigh a length of tubing accurately to within 1 1000 lb. The relationship of weight to length and to OD tells us how closely the tubing wall or ID conforms to specifications. This fast, precise method of checking average wall or ID enables us to provide you with a tubing order whose overall uniformity is unusually high. In certain applications, tubing produced by this weight control method can materially improve performance for you. It results in minimizing variations in your product caused by tubing whose average wall or ID varies too widely from the required design mean.

This is but one of many modern tools and techniques that help improve the already high quality of Superior small tubing.

Our premium quality small tubing is offered in a range of analyses (over 120) unsurpassed in the industry. Included are stainless, carbon and alloy steels, nickel and nickel alloys, beryllium-copper, titanium and zirconium—and 16 different Super Alloys. Our range of sizes and shapes is equally extensive.

Special services include statistical quality control, pilot and test lot sampling and melting, dye penetrant inspection, ultrasonic and hot tensile testing, eddy current and X-ray inspection, specification services—and field specialists who will call on you at your request.

For handy reference in your files, get a copy of Bulletin 40, "Selection and Application Guide for Superior Tubing." Write Superior Tube Company, 2005 Germantown Ave., Norristown, Pa.

Superior Tube

The big name in small tubing

NORRISTOWN, PA.

All analyses .010 in. to ⅝ in. OD—certain analyses in light walls up to 2½ in. OD

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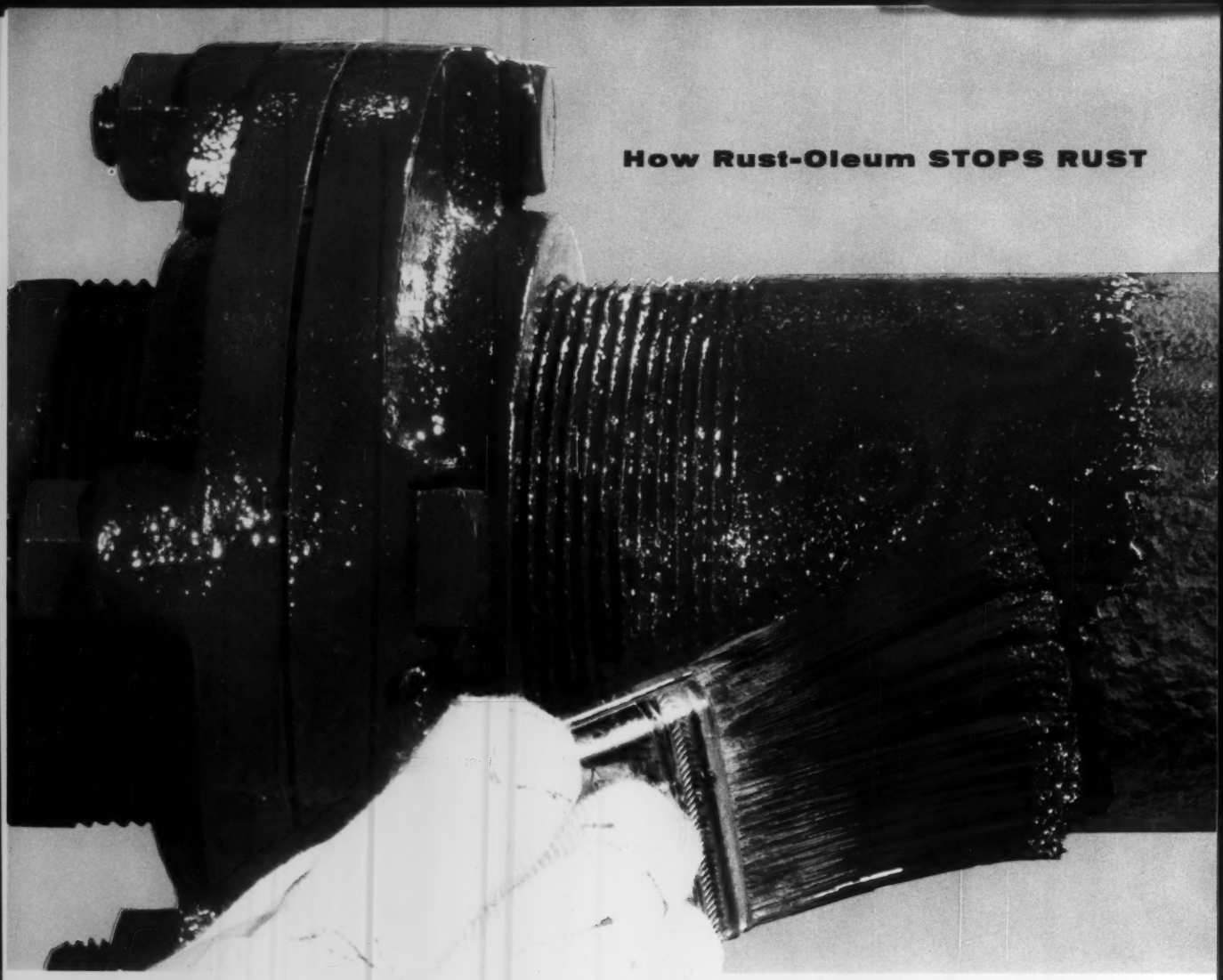
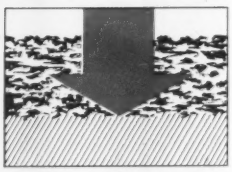


How Rust-Oleum STOPS RUST

Helping to make present equipment last longer

Apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound rusted surface! Specially-processed fish oil vehicle penetrates rust to bare metal!

Cut costly surface preparations and save time, money, and metal by applying Rust-Oleum 769 Damp-Proof Red Primer over sound rusted surfaces after simple scraping and wirebrushing to remove rust scale and loose rust. You can do this because Rust-Oleum's *specially-processed* fish oil vehicle penetrates through the rust to bare metal, driving out air and moisture that cause rust. At the same time, it dries to a tough, durable surface coating that resists general weathering up to one year before applying the Rust-Oleum finish coat. See how Rust-Oleum can save you time, money, and metal. What Rust-Oleum has saved for others is not half so important as what it can do for you.



Write for special thirty-page report showing Rust-Oleum penetration through rust to bare metal as prepared by Battelle Memorial Institute Technologists.

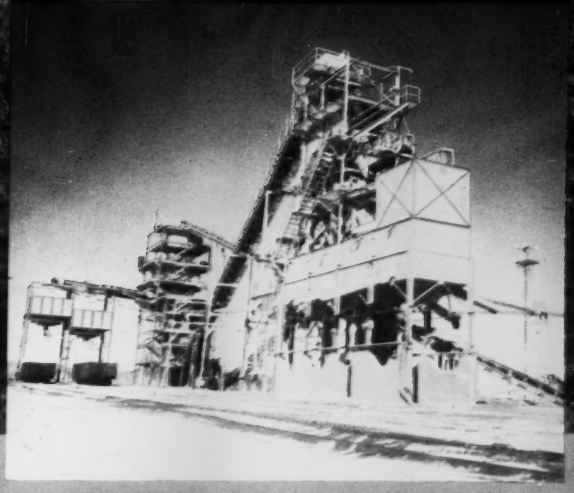
RUST-OLEUM®

Distinctive as your own fingerprint.
Accept no substitute.

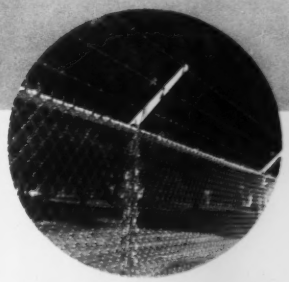
STOPS RUST!®

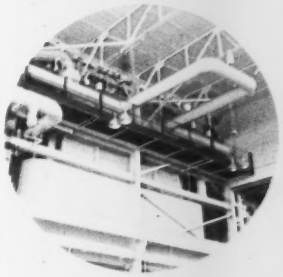
Prompt delivery
from Rust-Oleum
Industrial Distributor stocks.

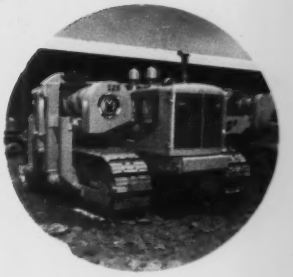
and beautifies as it protects!



Applying Rust-Oleum Aluminum finish coating over the Rust-Oleum primer for lasting beauty.







Follow-up with the Rust-Oleum finish color of your choice for double protection and lasting beauty!

Stop Rust!—and do it in the color of your choice—that's step number two in the Rust-Oleum rust-prevention *system*. Simply apply the Rust-Oleum finish color over the 769 Damp-Proof Red Primer. You receive *double protection* and greater compatibility, because Rust-Oleum finish colors utilize the *specially-processed* fish oil vehicle—and they dry to a firm, decorative, high-gloss finish that resists sun, fumes, heat, moisture, weathering, salt air, etc. You *beautify as you protect,* because Rust-Oleum finish coatings are available in Aluminum, Black, Green, Yellow, Gray, Blue, White, Red and many others. Write for complete information with color charts. Specify Rust-Oleum for new construction, maintenance, and re-modeling. Rust-Oleum Industrial Distributors maintain complete stocks for your convenience . . . and will be happy to consult with you on your rust problems.

What is your rust problem? What Rust-Oleum color do you need?

White, Black, Aluminum, Gray, Green, Blue, Yellow, Red and many others—they're all yours with Rust-Oleum! Beauty that lasts over-the-years. Rust-Oleum is also available in custom formulations to match unusual colors or to meet unusual rust-producing conditions. Send us your rust problems. We'll send you complete details—no charge or obligation.

ATTACH TO YOUR LETTERHEAD FOR THE FACTS

Rust-Oleum Corporation
2990 Oakton Street • Evanston, Illinois

Please send me the following.

- ☐ Complete literature with applications and color charts.
- ☐ Information on matching special colors.
- ☐ Thirty-page report on Rust-Oleum penetration.

our research is your reward

SELAS automatic soldering machine doubles production of Johnson SILVER MINNOW

Two women operate the Selas soft-soldering machine. One assembles hook and spoon into each of 12 fixtures on indexing dial turntable. Other removes complete assemblies at rate of 5,000 per day. Previous hand method turned out 2,400 per day. Direct saving in labor cost: 42%.

When the Louis Johnson Company, Highland Park, Illinois — manufacturer of sport fishing equipment including the "Silver Minnow," a spoon-type lure — contemplated an investment in automatic processing equipment, it had to answer these questions:

- Is production high enough to warrant mechanization?
- Will there be savings in materials, time and labor?
- How fast can the equipment be amortized?
- Will it be flexible enough to meet changing production and economic conditions?
- Will the degree of mechanization disturb labor relations?

Soldering of the hook to the spoon was the operation under consideration and studies were conducted at the Johnson plant and in the Selas laboratory.

Visit Selas Booth 1344 at the ASTE Tool Show
. . . see this machine in production operation

The results of the cooperative study indicated satisfactory answers to the questions. A machine was designed and custom-built by Selas. Now installed for more than two years, it paid for itself in 13 months of seasonal operation.

Workers quickly adapt to the machine without training. Rejects are practically nil; heat patterning is precisely duplicated, assembly after assembly. And, since it has been used only on runs of 25,000 or more of the same assembly, and on only five of the six "Silver Minnow" sizes, a continuous comparison between manual and machine soldering has been possible . . . and to say the least revelatory.

Whatever your soldering or brazing needs, Selas will design, engineer and build fully-automatic or semi-automatic equipment for you — after simulating your production conditions, using your workpieces, in our laboratory. Since Selas designs, constructs, starts-up and services each machine, problems usually associated with divided responsibility are eliminated.

Send for Bulletin No. 14 "Production Brazing and Soldering" and reprints "Gas-fired Machine Brazing" and "Mechanical Heating puts Brazing on the Production Line." Selas Corporation of America, Dresher, Pa.

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers

DEVELOPMENT • DESIGN • CONSTRUCTION

SELAS

STEEL

The rotor-hub assembly on a helicopter is an extremely critical mechanism and the steel in it must withstand very high impact loads especially when blade pitch is changed. That's why orders so often read—"Green River only." Under the total management of Green River's new parent—Jessop Steel—the big arc-type furnaces at Owensboro, Kentucky are producing the only steel in the world processed under the Dornin patents. Tradenamed MACRO-CLEAN, these steels have the unmatched forging qualities and grain structure needed for vital aircraft assemblies.

When you need billets, bars or slabs of aircraft and commercial grade alloy, stainless or forging quality carbon steels, ask for Green River MACRO-CLEAN through any Jessop office. You'll be doing business with the steel industry's new Southern Star.

These Jessop offices and representatives can now service you with Green River Products

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Indianapolis, Ind.
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WAREHOUSE STOCKS AVAILABLE

"New Southern Star"

GREEN RIVER STEEL

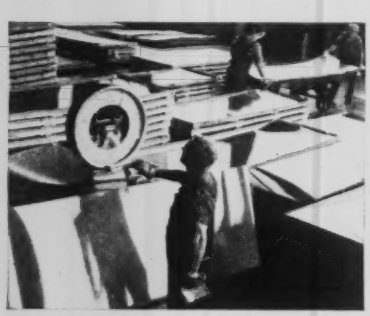
CORPORATION · OWENSBORO, KENTUCKY

A SUBSIDIARY OF JESSOP STEEL COMPANY

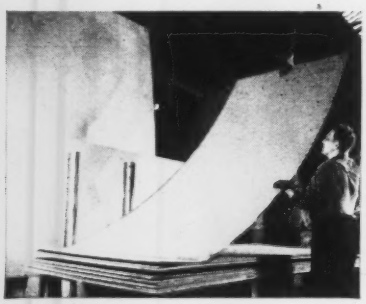
2351

types, shapes, sizes and finishes of Allegheny stainless in stock at Ryerson

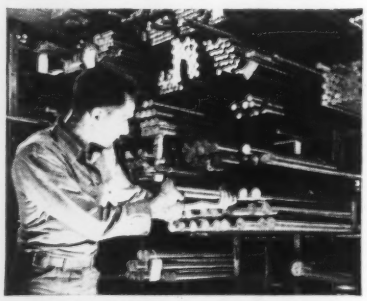
When you want stainless fast . . . anything from one to 2351 types, shapes, sizes and finishes . . . telephone Ryerson. You can depend on accurate processing and quick shipment from Ryerson . . . the nation's oldest supplier of stainless from stock.



STAINLESS SHEETS—Eleven analyses of Allegheny stainless sheets, including nickel and straight chrome types. Extra wide sizes, also, to reduce welding costs. Expanded and perforated sheets.

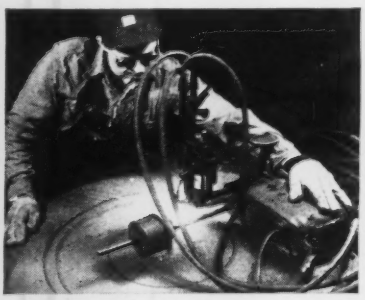


STAINLESS PLATES—Nine analyses, including plates to Atomic Energy Commission requirements and to ASTM specifications for code work. Also extra low carbon types for trouble-free welding.

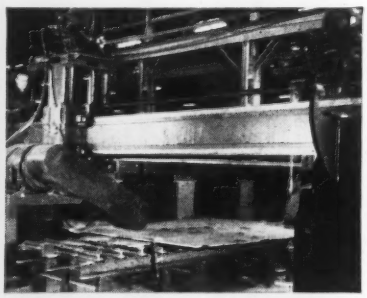


STAINLESS BARS AND ANGLES—Eight types, including rounds, squares, flats, hexagons and angles. Free-machining bars with both analysis and mechanical properties controlled for best performance.

STAINLESS PIPE AND TUBING—Light wall, standard and extra heavy pipe, ornamental and regular stainless tubing. Also screwed and welding fittings and Cooper stainless valves.



STAINLESS CIRCLES, RINGS, SPECIAL SHAPES—No matter how intricate, we can flame-cut practically any shape from stainless steel plate. One piece or a thousand.



TRUE-SQUARE ABRASIVE CUTTING—Stainless plates up to 12′ x 25′ cut absolutely square on abrasive disc machine. Length and width tolerance plus or minus 1/32″.

RYERSON CERTIFIED QUALITY

RYERSON STEEL

Member of the INLAND Steel Family

Principal products: Carbon, alloy and stainless steel—bars, structurals, plates, sheets, tubing—aluminum, industrial plastics, metalworking machinery, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND DETROIT • PITTSBURGH • BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Change in Merger Trends?

Mergers are declining in number, states a Federal Trade Commission report. During the first quarter, 226 were under negotiation, compared with 238 in the same period of 1957. For the nine months ended Mar. 31, FTC counted only 731 consolidations, compared with 786 during the corresponding period a year earlier. Both the FTC and the Justice Department also detect fewer mergers of major economic significance. Probers now list an average of 18 mergers a week that warrant checking, vs. 20 a year ago.

The Steel Merger Case

Testimony continues in the court trial of one of the most significant mergers of the decade, the proposed union of Youngstown Sheet & Tube Co. with Bethlehem Steel Corp. Last week the government was presenting small makers of wire rope as witnesses. They testified that the merger would mean the loss of Youngstown as a customer. Whatever Federal Judge Edward Weinfeld's decision is, it's certain to be appealed by the losing side. So the final decision is still many months away.

How To Pay Middle Management

What should you pay middle management? Robert J. Howe, director of salary and organization for Thompson Products Inc., Cleveland, suggests: "If a division manager is paid a base salary of $50,000, the highest man under him will probably receive about 55 per cent of that, although the figures will range from 40 to 70 per cent. The lowest member of the manager's team is likely to receive about 25 per cent, but that ranges from 18 to 31 per cent." But the salary spread between the head of a team and his subordinates generally decreases when the boss is at a lower pay level. If the manager gets $20,000, his top man will probably receive about 70 per cent of that; the lowest man, about 45 per cent.

What the Figures Say

How does business compare with what it was in the good old days? Take a look at these figures for U. S. Steel Corp., 1901-11, vs. 1946-56: Employment costs, as a share of the sales dollar, increased 24 per cent; taxes increased 623 per cent; profits decreased 61 per cent; dividends to the stockholders decreased 64 per cent; and reinvestment in the business decreased 57 per cent.

The States and Labor Welfare Funds

Don't look for much important legislation on the control of labor welfare funds to come out of this session of Congress. But some states may come up with potent laws. California, Connecticut, New York, Washington, and Wisconsin already have statutes requiring comprehensive reports showing details

of collections and distributions. A similar Massachusetts law becomes effective October, 1958.

The States and Right-To-Work Laws

State legislatures are also carrying the ball on right-to-work because Washington lawmakers will have nothing to do with that political dynamite. Eighteen states now bar the union shop, but Indiana is the only one among them that is heavily industrialized. Eight states without right-to-work now find it an issue—Delaware, Kentucky, Kansas, Colorado, Idaho, Washington, California, and Ohio. The last two are key areas. Ohio proponents of right-to-work seek to place a measure on the ballot. In California, the issue will be decided in November elections. Democrats are against it. Republicans split on the matter.

Ohio Utilities Plan Peak Outlay

Ohio's eight independent light and power companies will spend $287 million on construction in 1958. Biggest spenders: Cleveland Electric Illuminating Co. and Ohio Edison Co., each budgeting $65 million. The 1958 figures exceed the average annual spending for new construction from 1948 through 1957 by 64 per cent.

The Electronic House

American homes of the future will have household electronic centers, predicts John L. Burns, president of Radio Corp. of America. "The electronic housekeeper will rouse you from sleep in the morning, close the windows, start the coffeemaker and toaster, cook the bacon and eggs, open the garage doors, and warm up the car. While you are away from home, instructions fed into the center will take care of washing the dishes, doing the laundry, regulating the heat, cleaning the house, and paying the milkman. When you return home in the evening, the center will see that dinner is ready and the television tuned to your favorite program."

Boom in Photocopy Devices

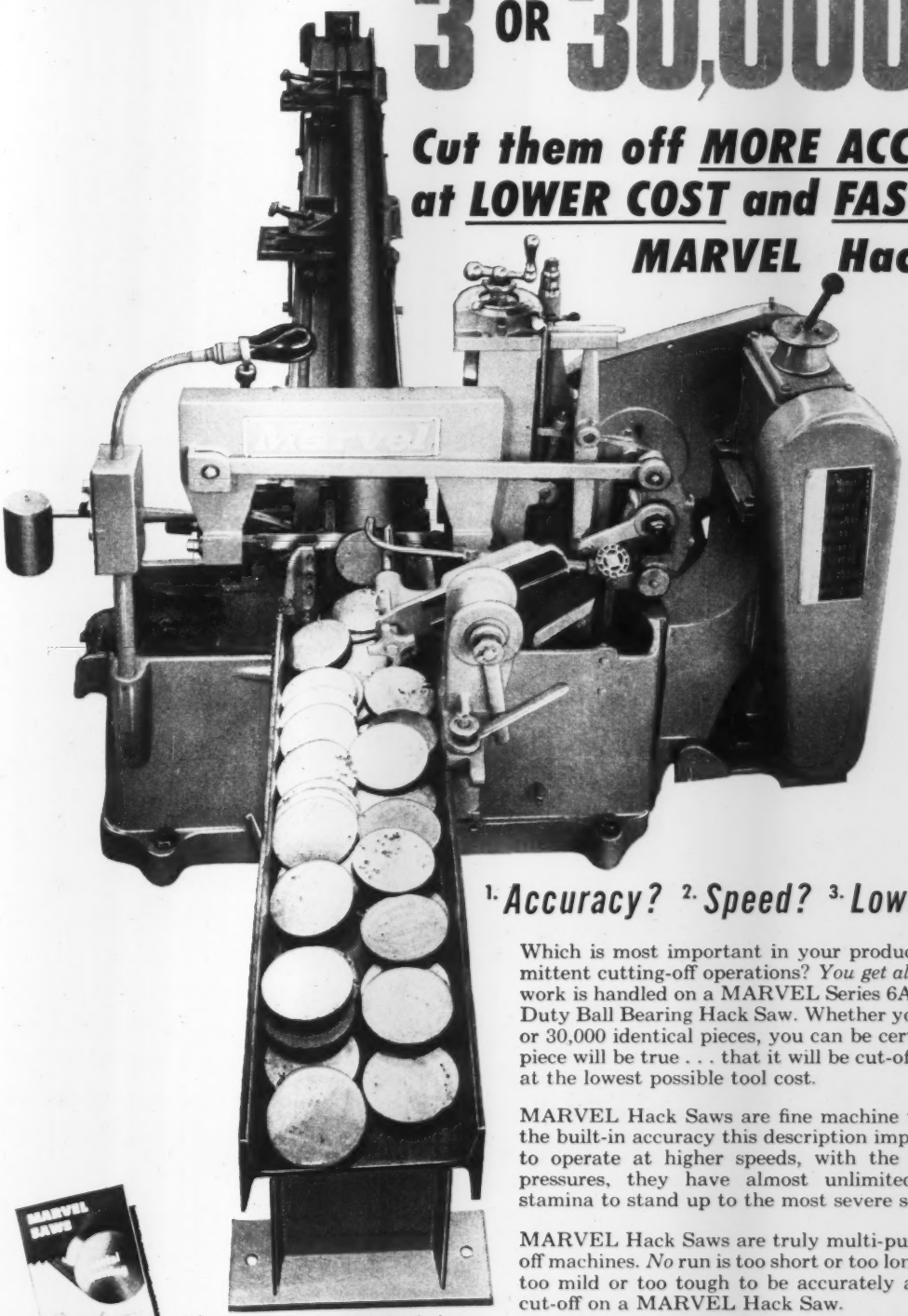
Makers of photocopy devices expect a 19 per cent rise in volume this year despite the recession. Sales last year hit $150 million (57,500 units), compared with about $40 million in 1952 (7750 units).

Straws in the Wind

Stauffer Chemical Co. has halted production of titanium sponge . . . Grumman Aircraft Engineering Corp. has a $75,000 contract to work on merchant ships equipped with hydrofoils (winglike devices mounted on stilts and attached to the bottom of a ship). They could make speeds up to 100 knots possible . . . At least two gray iron foundries have negotiated wage reductions . . . The Army Corps of Engineers will make interim reports this summer on the feasibility of enlarging about ten harbors on the Great Lakes . . . The Ohio Supreme Court says it will quickly rule on whether unemployed workers in the state may be paid SUBenefits.

3 OR 30,000 PIECES

Cut them off MORE ACCURATELY at LOWER COST and FASTER on a MARVEL Hack Saw



1. Accuracy? 2. Speed? 3. Low Cost?

Which is most important in your production or intermittent cutting-off operations? *You get all 3* when your work is handled on a MARVEL Series 6A or 9A Heavy Duty Ball Bearing Hack Saw. Whether you're cutting 3 or 30,000 identical pieces, you can be certain that each piece will be true . . . that it will be cut-off quickly, and at the lowest possible tool cost.

MARVEL Hack Saws are fine machine tools, with all the built-in accuracy this description implies. Designed to operate at higher speeds, with the heaviest feed pressures, they have almost unlimited power and stamina to stand up to the most severe service.

MARVEL Hack Saws are truly multi-purpose cutting-off machines. *No* run is too short or too long, *no* material too mild or too tough to be accurately and efficiently cut-off on a MARVEL Hack Saw.

Catalog C56 has complete details, facts and figures on MARVEL Metal Cutting Saws. Write for it today.

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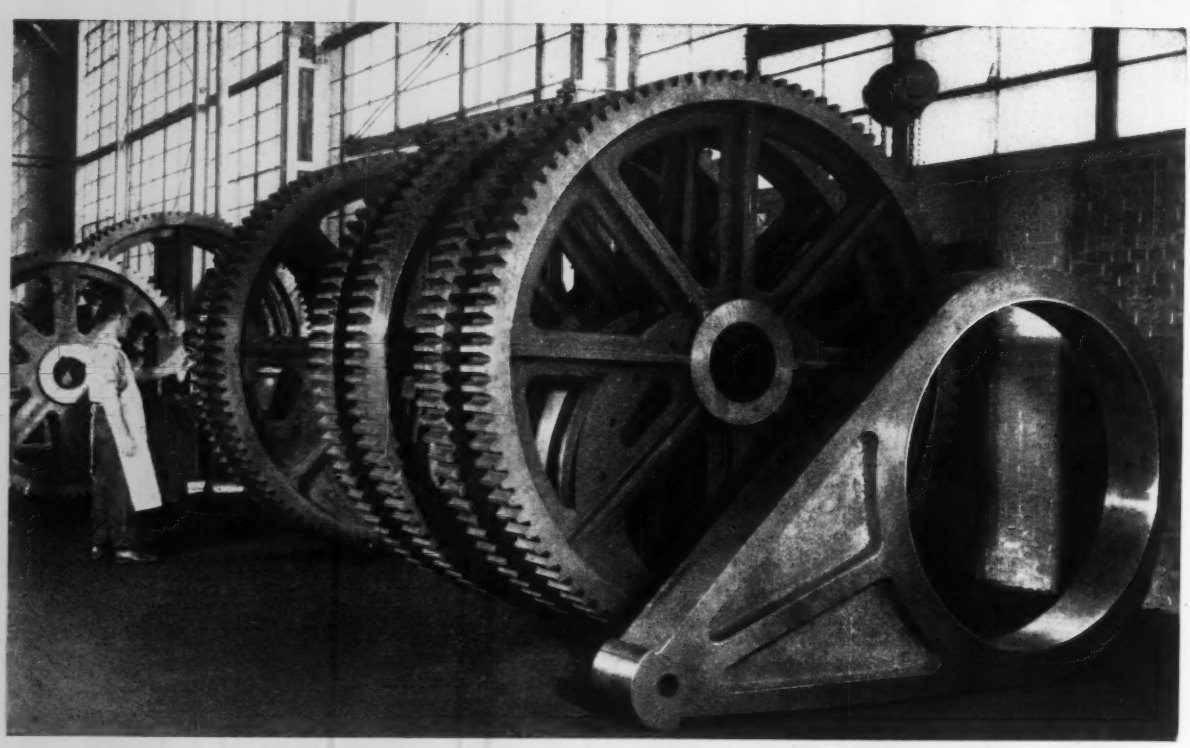

Dynamically stressed parts for 2000-ton "tryout" press...

Made of ductile cast iron, for superior strength, needed wear resistance

These large gears and connecting rod are used in a 2000-ton mechanical "tryout" press. In discussing his choice of ductile iron for these critical parts, Stewart Cumming, the designer – had this to say:

"We have for years favored cast iron for gear teeth and eccentrics because of its good wearing properties in bearing surfaces, but in some cases were forced to use either steel castings or weldments in order to obtain the necessary strength.

"The development of ductile iron enabled us to use this material to advantage, by providing the strength required for gear teeth without sacrificing good wearing surfaces on tooth faces.

"In the intermediate spur tooth gears and high speed herringbone gears of these large presses, good tooth-bearing surface qualities are particularly important. These gears are subjected to heavy stresses in clutching and braking.

"The use of ductile iron enabled the eccentric strap portion of the connecting rods to be held to as small a cross section as would be possible with steel – a distinct advantage in gaining operating clearances. The knuckle joint end, which is subject to high bearing loads at the time of impact, has better wearing properties in a bearing surface than could have been attained with an unheat-treated steel."

2000-ton "tryout" press (shown forming auto fenders) can handle most large dies or group of dies. Built by Federal Engineering Company, Detroit, a major builder of machinery, dies and tools, and designed by Stewart Cumming & Son, Ferndale, Michigan (engineers in the same line) with ductile iron in key operating parts.

More ductile iron advantages...

Other designers report additional ductile iron advantages for gears: excellent machinability, high damping capacity, and good castability. Surface hardening techniques can usually be used, too, to increase hardness to 600 BHN.

You'll find all these subjects and more covered *in detail* in Inco's new "Ductile Iron Digest." Send for one.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N. Y.

D ductile iron...the cast iron that can be twisted and bent.

Paradox in Paradise

Within the borders of these United States we have the greatest industrial machine the world has ever seen. For every production worker there is $16,000 worth of plant and equipment ready to turn out practically anything we want to make.

Every third person owns an automobile. Two-car families are commonplace. A family kitchen without at least one modern appliance is a rarity. We have plenty of everything.

Even in this paradise, we can support a $40-billion defense budget and $4 billion for mutual security that account for 10 per cent of our total production of goods and services.

Yet we are in trouble.

Industrial production is sliding faster and farther than it did in 1954 or 1949. (The Federal Reserve Board index was down to 128 in March, which is way off the peak of 147 in December, 1956.)

The steel industry will be lucky if it makes 90 million tons of steel in 1958. (It made 18 million in the first quarter.)

The auto industry may make 4.5 million cars in 1958. (It turned out 1.2 million in the first quarter, plans 1 million in the second.)

Capital spending has been falling since the third quarter of 1957. If it reaches $32 billion this year, it will be $5 billion off the 1957 pace.

Some companies are losing money. More are cutting the salaries of white-collar workers.

Much of the blame is placed on the consumer. He is choosing to save his money, pay off his debts, buy only the things he needs or things he feels are reasonably priced. He is passing up what he can do without and what he considers outrageously priced.

All the frantic efforts to make the wheels of our industrial machine spin faster are concentrated directly or indirectly on the consumer. They include "buy-now" drives, easier credit, and tax cuts, even though the government is already spending more than it is taking in.

Such palliatives will contribute to just one thing: Inflation.

We suggest that the real cure calls for a big dose of common sense. If we hold down wages, costs, and prices, the investor will want to invest and the consumer will want to buy.

Irwin H. Such
EDITOR-IN-CHIEF

Bringing two purchasing agents together over a friendly lunch resulted in an unusual sale.

It all started at the plant of an appliance manufacturer where Jack Hammond, an Inland sales representative, watched as a 12" diameter hole was blanked out of a sheet of steel. Noting carts filled with the punched out discs, he asked what was done with them. "We sell them for scrap," was the answer.

A few days later, Jack was in the plant of another customer . . . a metal specialty fabricator. Here, he saw a cup being drawn from steel circles . . . and got an idea. After cross-checking specifications, he found that the scrapped blanks of customer "A" would work perfectly for customer "B."

Getting these customers together at lunch had this happy result: one, now, obtains a much better price for his blanks . . . the other has a steady source of preshaped steel circles at a price that reduces his production costs over $6,000.00 a year.

We like to feel that Jack's action in this instance is typical of all Inland sales representatives. We think that their interest goes beyond just "selling steel." We hope you do too.

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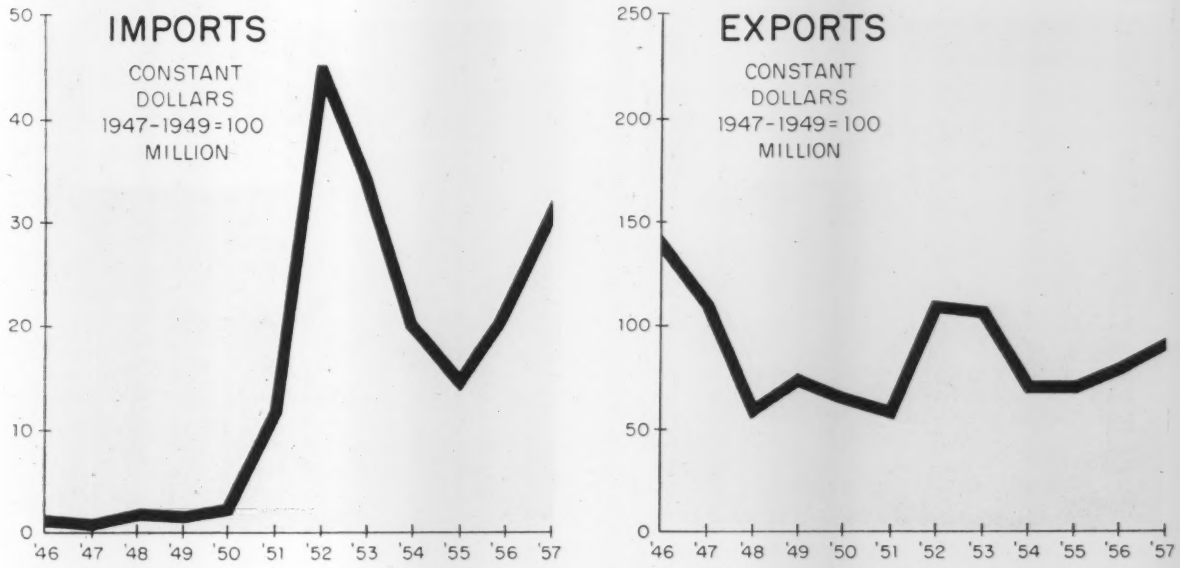
INLAND

Machine Tool Situation at a Glance



Source: U. S. Department of Commerce. Import figures are for both metal cutting and forming machines. Export figures are for metal cutting types only

Builders Hit Trade Squeeze

They ask Congress for tariffs to prevent undue loss of their share in the domestic market. Many build, or will build, abroad to get better competitive position there

LAST YEAR, U. S. machine tool companies built 724 radial drills. Nineteen were for export. U. S. users bought 340 foreign built radials, 47 per cent of the number domestic builders produced.

Those figures point up the problem facing domestic tool builders. They were given in testimony to the House Ways & Means Committee by J. Herbert Myers, director of overseas operations, Cincinnati Shaper Co., Cincinnati.

The Core—Three squalls disturb the industry's economic climate.

First: The recession brought drastic reductions in capital spending; the machine tool industry is operating at about 30 per cent of capacity.

Second: The high cost of building machines here, and dollar shortages in many of the world market places deter export business. The National Machine Tool Builders' Association says that exports used to account for 20 to 30 per cent of the U. S. production; in 1957 the figure was slightly over 10 per cent. Competition from foreign built machines is getting stiffer in countries that have practically no machine tool industries of their own (in South America, for example), as well as those which are strong domestic producers.

Third: Healthy foreign machine tool builders are taking increasingly larger chunks out of the domestic market. Mr. Myers says that reciprocal trade has been a one-way street in several areas. He singles out standard machine tools like radial drills, engine lathes, turret lathes, and shapers.

Proposal—To prevent some segments of the industry from being crippled in the domestic market place, Mr. Myers urged the committee to put more teeth into the Trade Agreements Act.

Pending bills would permit the President to boost the tariff by as much as 50 per cent over the levels that were set in 1934. Mr. Myers testified that this might provide adequate protection in some areas, but in others it would not. "In my judgment," he said, "there are a good number of foreign builders who would have little difficulty absorbing a 45 per cent tariff, and they provide the greatest threat to the U. S. industry."

The NMTBA proposal, submitted by Mr. Myers: Give the President authority to raise the tariff "as high as is necessary in the interest of the national security." This would remove the 50 per cent limit, and since machine tools are at the base

Barriers Abroad

EIGHT countries took about 80 per cent of U. S. machine tool exports in 1957. But most of them impose trade barriers in the form of tariff rates, import restrictions, or both. Not indicated here: U. S. builders are at a price disadvantage because their manufacturing costs are higher than those of competing nations.

Country	*Tariff Rates (%)	Trade Restrictions
Australia	12½-60 (Includes primage. Lower rates apply to machines not made in Australia.)	Import licenses are tough to get; U. S. machines can go in only if similar machines aren't built in Australia or Great Britain, and if the end use is important to defense or national economy.
Brazil	25-85 (Includes surtax.)	Current dollar shortage is biggest barrier.
Canada	7½-22½ (Lower rates apply to machines not made in Canada.)	None
England	17½	Import licenses issued only when no alternative machine is built in England, or when delivery of English machine is over two years.
France	25½-44½ (Includes "value-added" tax.)	In general, licenses are not granted for dollar goods considered nonessential if alternate is available.
Germany	6 (No customs duty. Machine tools are subject to this turnover equalization tax.)	None
Italy	7-25 (Plus internal taxes averaging about 8 per cent.)	Dollar shortage forces restriction of U. S. imports. Import licenses tough to get if similar machines are available in Italy or in countries with a more favorable currency exchange.
Japan	15	All imports require licenses involving considerable red tape. Currency restrictions can limit dollar imports.

*In addition to the rates on machine tools, many of these countries levy duties or taxes on electrical equipment and tooling.
Source: National Machine Tool Builders' Association survey.

of our defense capacity, it would set the stage for higher tariffs on some machine imports.

Capacity Shift — Relatively high tariffs and trade barriers imposed on U. S. tools by many foreign countries are forcing many U. S. builders to move capacity abroad. Some have done it by building overseas plants; others have (or are arranging) licensing agreements with foreign builders. The result is the same: U. S. designs are built at foreign costs with foreign labor, materials, and components.

Both practices amount to the export of a portion of the machine tool industry, its jobs, its industrial consumption, and part of our domestic production base for defense and peacetime needs.

Several builders with overseas capacity admit they have thought about bringing part of their foreign production back into the U. S. if it's necessary to meet competition in the domestic market.

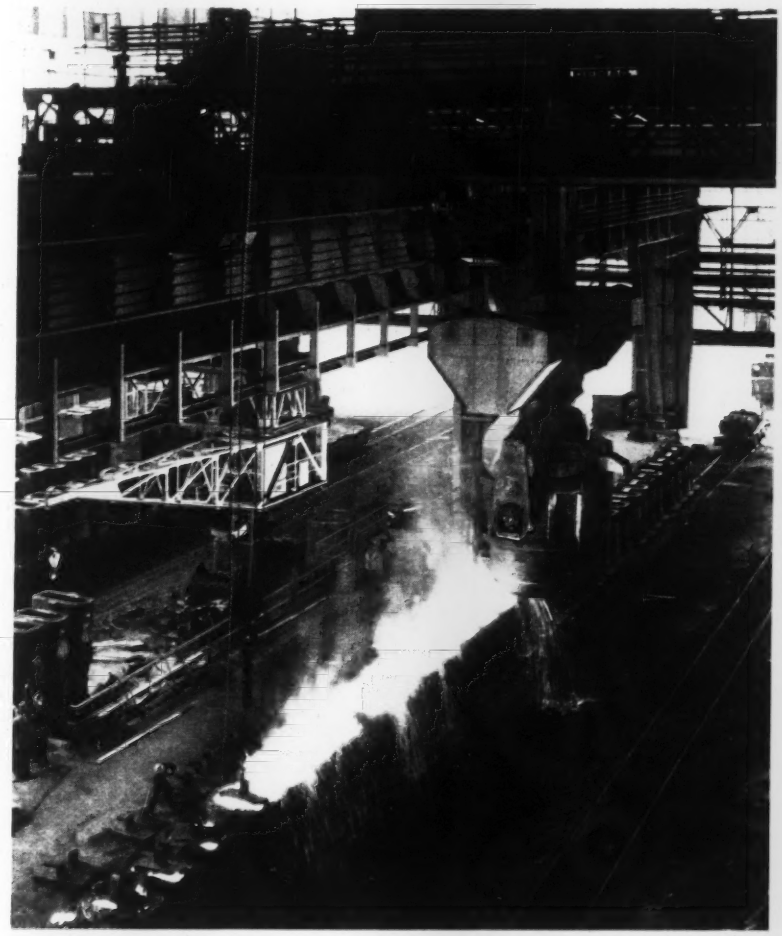
How Bad?—Builders say the export-import ratio is serious, particularly for standard machine tools. They assert the over-all statistics give rise to misinterpretations. (The Department of Commerce cites 1957 imports at $36.3 million, exports at $155.6 million.)

The industry's argument is that exports include a good share of special machine tools, home workshop equipment, used and rebuilt machines. They are virtually nonexistent in the import figure.

Also, the import figure is based on the "tariff value" (ordinarily the price at which the machines are offered in the country of origin); exports are based on U. S. price. So part of the difference is price.

Machine Comparison—A survey of foreign machine tool distributors just completed by NMTBA reveals that: Many foreign built machines are becoming more comparable to ours in design quality; American prices are almost invariably higher; and U. S. payment terms are generally more rigid than those of foreign competitors.

As for prices, the survey shows that U. S. machines cost an average of about 36 per cent more than those of competitors. A major influence on price is the cost of direct labor, reported by NMTBA at about $2.65 in this country for skilled machinists, vs. 40 cents to $1.25 abroad.



Ingots being poured at August Thyssen-Hutte in Duisburg-Hamborn, Germany

European Steel on Upturn

European steelmakers will probably have another big year, following record production in 1957. Look for them to maintain their brisk export pace

PRODUCTION of unfinished steel in Europe climbed to a record high in 1957, and judging from January and February production figures, the upswing will continue this year.

European countries (including the USSR) turned out 173,061,000 tons of unfinished steel last year, vs. 164,622,900 tons in 1956. West Germany produced 27,014,066 tons; Great Britain, 24,302,400 tons; France, 15,538,020 tons; and the USSR, 56,434,600 tons.

Projection—Another big year is in the making. In January, France had its best production month since 1949. German production in January fell only 5000 tons under its best month since 1949.

West Germany turned out 2,222,417 tons of unfinished steel in February, compared with 2,493,060 tons in January and 2,231,401 tons in December. Great Britain produced 2,096,641 tons in February, vs. 1,997,817 tons in January and 1,951,774 tons in December. February production in France was 1,631,719 tons of steel, compared with 1,820,383 tons in January and 1,737,281 tons in December. Production trends in other European countries follow the same pattern.

Trading—Even though Europe's steel production capacity is being built up, imports of finished steel continue to rise. Only West Germany and Great Britain imported less in 1957 than they did in 1956. But it's pretty certain that imports will start to decrease this year.

Exports from Western Europe in 1957 reflected the expansion in steelmaking capacity. Significant gains were registered by West Germany and Austria. Smaller increases were noted in England, Italy, and the Netherlands.

Look for exports to continue their climb.

Bank Predicts Orders

During the first half, foreign purchasers of equipment, materials, and services will place about $625 million in contracts and orders with U.S. firms which will be backed by Export-Import Bank loans, predicts President Samuel C. Waugh.

Export sales growing out of the bank's credits include orders being placed from present loans, plus those from applications pending approval by the board of directors, says Mr. Waugh.

The breakdown by major types of industry:

	Millions of Dollars
Agricultural commodities	$127.5
Railroad equipment	115.6
Steel mill equipment	76.9
Aircraft	65.8
Electrical equipment	23.9
Mining equipment	18.0
Telecommunications	17.5
Agricultural equipment	13.0
Machine tools	6.6
Other	160.6
Total	$625.4

Zagar's Recession-Curing Prescription:

1. **"Continue to grow."** Zagar plans a $100,000 expansion this summer in its sales and engineering departments.

2. **"Don't lose key personnel."** Zagar keeps its engineers busy designing new products and improving standard equipment.

3. **"Introduce new products."** Zagar developed three new products since its sales began to decline. They'll be exhibited at trade shows.

4. **"Promote your products."** The firm hired new salesmen and appointed a sales promotion manager this year. Zagar will demonstrate equipment at three trade shows this year—a record for the company.

5. **"Improve standard products."** Zagar developed a better tile drilling machine and built up production of standard components.

6. **"Strengthen sales force."** Zagar opened a district sales office in Detroit when sales through manufacturers' representatives fell below satisfactory levels in that area. A market survey will determine whether more such offices are required.

7. **"Substitute for falling markets."** When jet engine production dropped in September, 1957, the company lost orders. Quickly switching its sights, Zagar acquired work in the missile industry.

Zagar Routs Recession

Machinery manufacturer rejects storm-cellar psychology in favor of hard selling. New products and improvements in standard equipment are a spring tonic for sales

WHEN CUTS in defense and industrial orders hit Zagar Inc. last July, officials of that Cleveland machinery and tool manufacturer started to look for the nearest storm cellar but decided to scout new customers instead. As a result, sales in 1958 will equal those of record-breaking 1957.

Zagar's backlog dropped to $500,000 in late 1957—half its normal size. Sales to the jet aircraft industry plummeted in September. Large-volume industrial spending stopped. The company's first reaction was to curtail production. Then, as Frank G. Zagar, president, explains: "We realized that new product development and improvements to standard products would build a base for this company to grow on, when the recession ends."

Expansion, Not Recession—"We offer complete service to any manufacturer with a drilling problem. Customers ask us to develop special machinery for drilling parts. If we cut back in our engineering and production, we couldn't offer this service. You can't lay off a good engineer and expect to hire him back later. The only ones to benefit from a hitch in our belt would be our competitors," points out John P. Mrsnik, sales manager.

The prescription above shows how Zagar met the recession. Charles Janki, chief engineer, comments: "We will expand the productive capacity of our engineering department by 100 per cent this summer. While we stay within our special area of equipment to drill more holes cheaper, we find ample room for expansion in this field."

Sales Are Steady—This year, sales were strong in January but dipped in late February and March. Zagar expects a second quarter upswing, believing that this period will mark the end of its recession. Sales in 1958 are expected to equal the $2.7-million volume of 1957. Volume totaled $1.6 million in 1955 and $2.5 million in 1956.

"We see increasing signs of a gain this quarter," Mr. Mrsnik says. "Our backlog has held firm for six months. Our volume of quotations is well above year-ago levels. We are closing several orders more quickly than was possible in the first quarter. Sales of standard drill heads and fixtures and volume of orders for general tooling are holding firm. Demand grows every year for drilling equipment for printed circuitry. Only the lack of large-volume orders in capital equipment industries holds us down."

Foundation Stone—Sales officials at Zagar believe new products and aggressive promotion of standard products (gearless drill heads, drilling equipment and tools, and feed units), will be the basis for gains next year.

New at Zagar since sales began to recede in mid-1957 are three products intended to speed the customers' operations and cut their costs: 1. A multiple spindle, adjustable drill head. 2. A machine for tapping nuts that will handle 72,000 pieces an hour. 3. A printed circuit drilling machine that permits changing of patterns quickly.

Product Improvement—Advances in standard equipment supplement new products. Zagar is introducing a new acoustical tile drilling machine this year. The firm reports it has a production rate twice as fast as that previously achieved. It will drill larger tile sections. Equipment for drilling ceiling tile, a $50,000 business for the Cleveland company in 1954, netted sales of $500,000 last year.

With improved equipment, Zagar aims higher this year.

Jobless Pay from States Varies Widely

Workers without dependents receive benefits ranging from $25 to $45 per week

Maximum Weekly Benefits for Workers

(With no dependents)

STATES	WEEKS
New York	$45 x 26
Wyoming	$41 x 26
California, Connecticut, Idaho, Oregon	$40 x 26
Wisconsin	$38 x 26½
Minnesota	$38 x 26
Nevada	$37.50 x 26
Utah	$37 x 26
Pennsylvania	$35 x 30
Arizona, Colorado, Delaware, Maryland, Massachusetts, New Jersey, Washington	$35 x 26
Kentucky	$34 x 26
Kansas	$34 x 20
Maine, Missouri, Ohio	$33 x 26
Indiana	$33 x 20
North Carolina, New Hampshire	$32 x 26
Montana	$32 x 22
Nebraska	$32 x 20
District of Columbia, Illinois, Michigan, Rhode Island	$30 x 26
Iowa, New Mexico, West Virginia	$30 x 24
Tennessee	$30 x 22
Georgia, Mississippi	$30 x 20
Florida	$30 x 16
Oklahoma, Vermont	$28 x 26
Texas	$28 x 24
Alabama, South Dakota	$28 x 20
Virginia	$28 x 18
South Carolina	$26 x 22
North Dakota	$26 x 20
Arkansas	$26 x 18
Louisiana	$25 x 20
Alaska	$45 x 26
Hawaii	$35 x 20

Source: National Industrial Conference Board Inc.

AMOUNTS PAID to jobless workers under unemployment laws in the U. S., Alaska, and Hawaii vary considerably, says the National Industrial Conference Board.

The board points out that maximum weekly payments to workers without dependents range from Louisiana's $25 to New York's $45 (see table).

Allowances — Nine states and Alaska pay more to claimants with dependents. Connecticut's basic benefit is $40, adds $20 for dependents; Illinois pays $30 plus $15. Maryland and Massachuetts both pay basic benefits of $35 weekly. Maryland will allow another $8 for dependents. Massachusetts' workers with dependents are given the difference between the $35 base and their average weekly wage.

Michigan has basic benefits of $30 and $25 allowance for dependents; Nevada, $37.50 and $20; North Dakota, $26 and $9; Ohio, $33 and $6; Wyoming, $41 and $6; Alaska, $45 and $25.

Qualifications—In the nine states permitting it, dependents are children under specified ages (the range is 16 to 18). Three states (Illinois, Michigan, and Nevada) pay extra for certain adult dependents.

Utah and Wyoming have a flexible maximum. It's based on a percentage of the average weekly wage of covered workers during the preceding year.

Duration — Thirteen states and the Territory of Hawaii pay unemployment benefits for a uniform length of time to all eligible claimants. The states: Georgia, Maine, Maryland, Mississippi, Montana, New Hampshire, New York, North Carolina, North Dakota, Pennsylvania, Tennessee, Vermont, and West Virginia. The other states and Alaska have variable maximum duration provisions based on prior earnings or employment.

A billet of columbium being formed at Du Pont's experimental station in Delaware

Columbium: Still on Trial

Metallurgists can't agree whether the metal has shown enough promise to warrant more study. It will have to make good within three years or be dropped

COLUMBIUM, a metal with good high temperature properties, holds the promise of lifting the ceiling on the speed of jet aircraft.

"If the temperature of application can be increased, engine size can be decreased with no loss in power output. Since materials used in manufacturing these engines can withstand temperatures only up to 1800° F, there is a serious limiting factor on power output," explains Dr. Morris A. Steinberg, head of the metallurgy department at Horizons Inc., the Cleveland process and material research organization.

Research groups such as Horizons are trying to develop columbium (also called niobium) content alloys for jet engine parts. Desired are materials permitting operations at 2200° F.

Present Uses — Since it was released from government control in 1955, columbium has been primarily of interest to the Atomic Energy Commission. It uses close to three-fourths of the metal produced annually (about 20,000 lb, guesses one research scientist).

The AEC alloys it with uranium to impart corrosion resistance in high temperature water and to prevent the uranium from being oxidized. Because it has a low neutron cross section, the metal is also suitable for cladding cores of fast reactors. It surpasses other metals (such as zirconium, molybdenum, and vanadium) in resisting heat and corrosion, says Dr. Ronald L. Carmichael of Battelle Memorial Institute, Columbus, Ohio.

The metal is also used in specialized nonferrous alloys, stainless steels, welding rods, and niobium (columbium) carbides. More than 30 superalloys containing columbium are being produced. Columbium content varies from 0.44 to 4 per cent. The newest of the group, containing 1.5 per cent columbium, 5 per cent zirconium, and 93.5 per cent uranium, is used as a structural material in a nuclear reactor.

The outlook for its continued use as a stabilizer in stainless steels is good, says Dr. Carmichael. When added to austenitic chromium-nickel stainless, it prevents carbide precipitation in the 800 to 1600° F range. Much of this steel (Type 347) is used in chemical and petroleum processing equipment operating at high temperatures in corrosive atmospheres. Its application is being extended to rotors and high temperature steam lines.

Reserves — Just four years ago, columbium was thought to be too rare to ever support an expanding industry. Present reserves are believed to be far in excess of any future industrial needs.

Deposits in North America are greater than the combined reserves of molybdenum and nickel. Africa and Norway also have large deposits.

If all reserves were reduced to metal, estimates one industrialist, the world would have 1.5 million tons of columbium. "I only hope scientists and metallurgists can find ways to make use of it," he concluded.

Prices—Columbium is being purchased at prices ranging from about $130 a pound for rods to about $50

a pound for sponge. But prices could change rapidly.

One manufacturer has estimated what prices of commercially produced columbium might be at various production rates: 5 tons a month, $50 a pound; 50 tons, $9; 1000 tons, $4.

Among major producers are Fansteel Metallurgical Corp., North Chicago, Ill.; Wah Chang Corp., Long Island City, N. Y.; Metallurg Inc., New York, and Kennametal Inc., Latrobe, Pa.

Potential—If the search for high temperature aircraft alloys is successful, columbium could have an unlimited future. But there are some doubters.

One research scientist observes: "I'm beginning to think research on columbium is a waste of time. I don't see a thing it can do that molybdenum can't do better or as well."

Adds another: "Columbium's only advantage over moly is its easier fabrication. Turn the coin over, and you're faced with the fact that columbium is more brittle at room temperature than is moly."

Says E. H. Smith, vice president, Kennametal: "We thought columbium was going to go great guns. The AEC was alloying it with uranium. But there has been no activity in the last six to eight months. There simply aren't any major uses at the moment."

But E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., still thinks the metal can solve critical design problems in jet engine parts. The firm entered into an agreement with Thompson Products Inc., Cleveland, for joint development work. The program will be carried through even though not much is being done now, says a Thompson spokesman.

Scientists at Westinghouse Electric Corp., Pittsburgh, are still optimistic and have developed a technique for ultrapure preparation of the metal. "Research indicates columbium offers excellent promise as a structural metal at temperatures above 1800° F," insists one Westinghouse researcher.

Prediction—One thing seems certain: Even columbium's most ardent backers will only give it another three years to make good.

After 1961, research programs will probably be dropped in favor of molybdenum.

Old Sol heats or cools for $450 a year as . . .

Sun Works for Solar House

WATCH solar heating of homes as a market for products of the metalworking industry.

A house designed to receive all its heat requirements from the sun has just been completed in Paradise Valley, 7 miles northeast of Phoenix, Ariz. The heat collecting, storage, and distributing system is made almost entirely of metal. All the equipment used is available from commercial sources.

Two-Thirds of U. S.—A measure of the potential market is this statement from John I. Yellott, a solar scientist and executive vice president of the Association for Applied Solar Energy: "This solar heating system can be used in homes in two-thirds of the U. S., and it will pay for itself in less than ten years." (The exception is the eastern third of the nation.)

The Arizona house gathers solar energy through 68 collector panels which are turned by a clock to face the sun each day. Water circulated through blackened copper tubes in the collectors is heated and sent to an underground storage tank for use at night and in cloudy weather. This heat is transferred into the house as needed through coils mounted on the intake faces of two standard air-to-air heat pumps.

Double Floors—A double-floor system is used to circulate conditioned air under each room before it is discharged into the house through perimeter grilles.

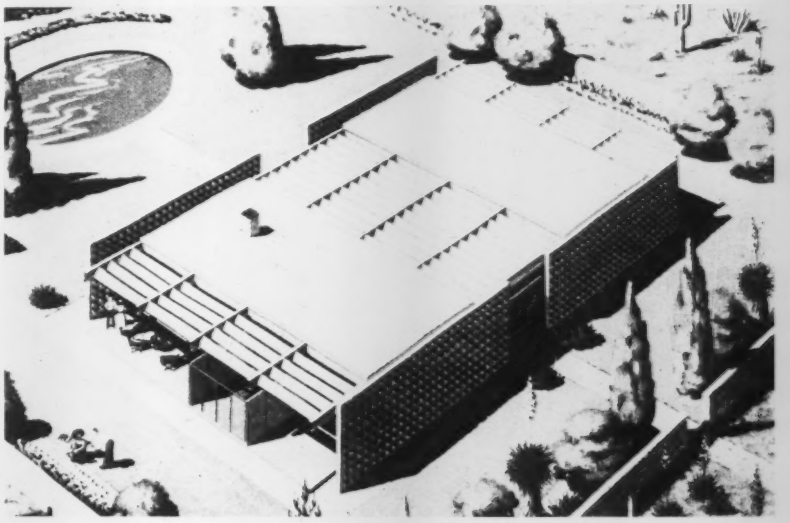
At night and during the summer, the sun collecting panels are rotated so that their aluminum-clad backs face the sky.

A few of the collector panels heat water for baths and laundry.

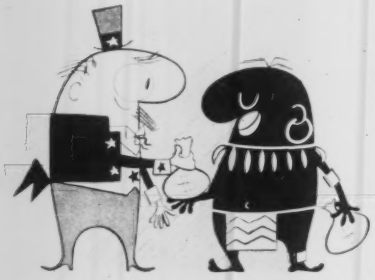
Supporting and strengthening the collectors are steel beams and columns and steel pipe.

Pool Storage—A swimming pool serves as an additional storage of heat in winter. In summer, water from the pool is used for cooling.

The solar heating system in the Arizona house cost about $4000 more than a conventional heating and cooling system. But bills for heating and cooling (including maintenance) are expected to be only $450 a year.



What appear to be louvers at the center and at two ends of the roof of the new solar house, near Phoenix, Ariz., are solar heat collectors. The house consists of two distinct sections, separated by a central court. A glass-enclosed walkway connects the two sections



Foreign Aid May Be Halved

EXPECT the President's request for $3.9 billion in fiscal 1959 foreign aid funds to be cut to about $2 billion. Hearings in the Senate and House are completed; floor debate could start early next month.

The bulk of the cut will probably come in funds slated for development programs ($1.3 billion), but military funds ($2.6 billion) will not be immune to the ax. Congress sliced more than $1 billion from the President's request for fiscal 1958.

Main categories of mutual aid: 1. Military assistance—the direct supply of arms to our allies (50 per cent of the appropriations). 2. Defense support—economic assistance deemed necessary to help an ally support a military effort beyond the country's abilities (26 per cent of the appropriations). 3. Development assistance—long range projects on a loan basis (11 per cent). 4. Technical assistance—personnel for internal administration of the country (5 per cent). 5. Special assistance—emergency funds (8 per cent.)

Motivation for the Congressional cuts will be our recession and the growing feeling that foreign aid is the biggest pork barrel program of all. C. Douglas Dillon, deputy undersecretary of state for economic affairs, reports the program provides at least 600,000 jobs for U. S. workers and almost $1.5 billion in sales of military equipment by U. S. firms. But chances are his argument will be lost in the scramble to save money somewhere in the fiscal '59 budget. An indication of the poor fiscal position of the budget when it finally gets through Congress: $1.5 billion saved on foreign aid would just match Defense Secretary Neil McElroy's request this month for supplemental defense funds. To pay for the two Polaris-launching submarines included in that request (without adding to the deficit), Congress would have to scrap the whole technical assistance program.

More Machine Tools for Schools

Excess machine tools may be channeled to schools through state agency co-operation with the Department of Health, Education & Welfare, says Business & Defense Services Administration. Junior and senior high schools, technical schools, colleges, and universities will be eligible for tools.

About 13,000 tools owned by Uncle Sam were declared excess last year.

The program was started in 1919, but plenty of schools are training students on tools which are 50 years old, notes a BDSA executive. The six tool trade associations are backing the program. Besides helping the schools train better workers, the program will tend to disperse U. S.-owned tools and keep some of the surplus out of the market. Schools needing tools should contact their state agencies for surplus property.

SBA Steps Up Licensing Program

Watch the Small Business Administration's *Products List Circular* for more opportunities to participate in the benefits of foreign-held U. S. patents, government owned patents, and government research and development.

Deck Reynolds, ex-Olin Mathieson executive, now chief of SBA's Products Assistance Branch, reports his group is compiling lists of nonclassified R&D work which small firms might be able to use as a basis for new product development. The knowhow of large firms is also being asked for. The point of the program: Few small companies do any research, consequently are not fitted for our rapidly changing markets. If they can catch some of the benefits of the research of others, they stand a better chance of competing.

Present plans call for SBA to provide the information; then interested firms can work directly with the company or government agency involved—with help, of course, from SBA.

How McElroy Wants 1960's Funds Set Up

The controversy about the relative powers of the individual services and the Defense Department will be effectively settled by the fiscal 1960 defense budget—if Congress goes along with Mr. McElroy's plans.

Instead of allocating money to the services and then to the particular category of expenditure (such as procurement, maintenance, and R&D), the fiscal '60 budget will allocate money first to the category of expenditure. So $15 billion for procurement might be divided among the services, but scientific breakthroughs or emergency international situations would allow the defense secretary to move some of the money (probably not more than 10 per cent) from one service to another.

This plan, it should be noted, does little more than accomplish what President Eisenhower sought in January's budget message when he asked for a contingency fund of $500 million to be used as he saw fit. Congress is dead set against it, but may go along with the new allocation principle because money first allocated to a service will at least have that service's support in Congressional hearings. Unallocated funds are hard to justify.

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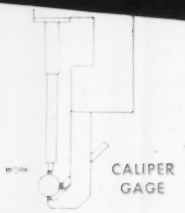
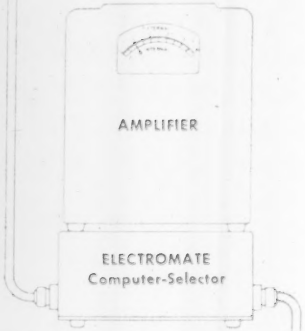
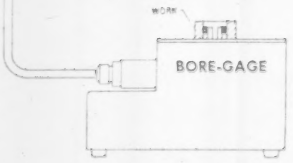


With the CEDA SIZE equipped B&S No. 5 Plain Grinding Machine, diameter readings are transmitted to Amplifier from Electronic Caliper Gage riding on work. When diameter is within about fifty millionths of finished size, CEDA SIZE lever is depressed, which produces and controls an extremely fine grinding feed. When Amplifier indicator reaches zero, the specified size has been duplicated to ±0.000010" or less.



The ELECTROMATE Computer-Selector attachment, when used with CEDA SIZE, automatically computes the differential between the internal diameter of the mating sleeve (set on Electronic Bore Gage) and the external diameter of the part being ground. When indicator reaches zero, clearance (preset with masters) has been duplicated to ±0.000020" or less.



In addition to CEDA SIZE and ELECTROMATE the No. 5 Plain Grinding Machine shown is also fitted with ELECTRALIGN (upper rear amplifier) to insure easy, accurate control of taper.

Handle Engineers Carefully

The nature of their work plus their traits and desires make it advisable to re-evaluate and strengthen certain areas of management. That's the finding of a new study

"ENGINEERS like challenging work and they like to go about it in their own way. In addition, they're critical and skeptical. You have to show them the facts to back up your claims. And they don't like direct bossing."

So says Dr. John W. Riegel, director of University of Michigan's Bureau of Industrial Relations, who is completing a two-year study on managers' relations with engineers and scientists. Some of the findings:

In Everyday Work—Engineers are individualistic; they have broad, long range goals; they're ambitious and they need recognition. "From a supervisory standpoint, that often causes problems," says Dr. Riegel.

"It's the young engineers who have the toughest time of it," Dr. Riegel says. "They come from school, where they have been looking at stimulating theoretical problems, to a company where they settle down to routine tasks. That's a hard shock to absorb."

Management can alleviate it by: 1. Reviewing counsellor induction procedures. 2. Having men keep an eye on younger engineers as they enter the business and proceed through the ranks. "Don't let induction courses become mechanical," warns Dr. Riegel.

In Upgrading — Engineers are more salary conscious than scientists, Dr. Riegel reports. Managers say their biggest problem is adjusting individual salaries on merit. It's difficult to measure how well a researcher or engineer is doing.

Engineers want first-line supervisors who can judge them on merit. That calls for technically qualified men. Technical training isn't so essential for higher supervisors. As Dr. Riegel puts it: Engineers go to their immediate boss for help and he has to have it for them.

Prime asset of an engineering supervisor: Winning subordinates' respect on the technical level. His ability to get them the materials and the support they need further enhances the working relationship. A pleasant personality helps.

And engineers want a pat on the back from their bosses—more so than do researchers, the study discovers.

Intangibles—Dr. Riegel believes that intangible rewards provide most of the keys to better management-engineer relations. You can't treat engineers and scientists alike. The desire to associate with other professionals ranks much lower for engineers than for researchers. The study shows scientists lack desire (it's at the bottom of their list) to associate with nonprofessional colleagues like accounting, advertising, and sales people. Engineers rank such associations much higher; they're easier to get along with.

Summary — The study indicates that management should:

- Free engineers and scientists from routine tasks.
- Explain why they have to do such work when it's unavoidable.
- Let them be their own managers as much as possible.
- Pat them on the back when they do well; be fair and logical when criticizing.
- Make sure direct supervisors are technically qualified.

The Study—Dr. Riegel's group talked with top executives, supervisors, and technical employees in ten companies. The firms were picked because, in the university's opinion, they are well-managed. Cross-sectioned as to age and work, the study covers 400 persons (276 are engineers and researchers).

The project covers many areas; two phases are complete and out in book form: 1. *Administration of Salaries for Engineers and Scientists.* Cost: $4.50. 2. *Intangible Rewards for Engineers and Scientists.* Cost: $3. They're available through Publications Distribution Service, University of Michigan, Ann Arbor, Mich.

Buys Land To Expand

Tait Mfg. Co., Dayton, Ohio, pump manufacturers, purchased a 57-acre tract of land adjoining its Gettysburg, Ohio, plant. The Gettysburg branch was opened in May, 1957, for development and manufacture of submersible pumps.

New Company Established

Hancock Industries established a new operating firm, Control Systems Co. The new company will assume responsibility for development, design, and marketing phases of an electromechanical control and monitoring systems.

A GOOD SUGGESTIONS SYSTEM:
Gets Employee Ideas to . . .

IMPROVE	Product Quality Housekeeping Working Conditions Office Procedures Public Relations Production Methods Product Appearance
COMBINE	Operations Methods
DEVISE	New Machines New Fixtures New Methods
INCREASE	Yields Production Co-operation Sales
REDUCE or ELIMINATE	Waste Hazards Maintenance Spoilage Duplication Breakage Paperwork
CONSERVE	Materials Time
RECLAIM	Materials Equipment
PROMOTE	Employee Welfare Public Relations
SUBSTITUTE	Less Costly Materials Less Costly Equipment More Efficient Equipment

Source: National Association of Suggestion Systems.

Reaps These Benefits . . .

Promotes co-operation with supervision.

Reveals hidden talent (for promotion, transfer).

Develops key men in each department.

Turns gripers into constructive suggesters.

Increases employee interest in the firm.

Reduces costs, waste, time.

Improves efficiency, quality of work, employee relations.

Provides two-way communication.

Induces employees to think in terms of the company's interests.

Remunerates more valuable employees.

Makes each employee a potential troubleshooter.

Persuades employees to think.

Allows employees to be active "team members."

Trains employees to think.

Creates an atmosphere of reception to change.

Gives supervisors a better knowledge of their departments and men.

Listen to Your Employees

THOMPSON Products Inc., Cleveland, had a problem: Polishing belts, an expensive item, were fraying and breaking. Engineers could not find the answer, but employee Emma Gabor did: She put nail polish on the belt edges. "Just like stopping a runner in my hose," she said. She was paid over $6000 for the idea; it saved the company about $43,000 a year.

How's Your Plan?—Now is the time to cash in on your suggestions system (or to initiate one). Employees working short weeks are anxious to pick up extra money from awards. Others realize that the company is trimming the fat and want to convince the boss they're essential.

Now is a good time from a management standpoint, too. With profit margins narrower, the boss should be wide open for suggestions on how to pare expenses and improve efficiency.

Many executives consider suggestions systems an important phase of their cost reduction and employee relations programs. Proof: National Association of Suggestion Systems (where firms swap ideas on how to get ideas) has 1000 members. But management has questions about certain areas of the suggestions technique:

Does It Pay? — Well-handled plans do. A survey of 206 companies shows an average award payment of $30 per adopted suggestion. Since awards average 10 to 15 per cent of the first year's net savings, the average return per adopted suggestion is about $230. If the idea benefits the company for three years (many last much longer), it would return $690. Multiply that times 11 adopted ideas per each 100 employees (metalworking's average), and you see that suggestions systems are a profitable venture.

What's the Award Basis?—Earnings for tangible ideas are easy to figure. You pay the suggester a percentage of your savings. Most firms give 10 to 15 per cent of the first

Pays Special Attention to . . .

Rejection Letters: How To Say "No"

SUMMARIZE details of proposed suggestion.

EXPLAIN the action taken. Tell why it can't be adopted. Keep all arbitrary factors out. Give sufficient information about investigation to show fairness and consideration.

THANK suggester.

APPEAL to him to try again.

USE positive statements showing appreciation of his effort, co-operation, and eagerness to do a better job.

Adoption Letters: How To Say "Yes"

DESCRIBE the suggestion briefly.

EXPLAIN the investigation of the suggestion.

SHOW benefits to company—tangible or intangible.

REPORT how the award was computed.

DEPICT method of installing idea.

ENCOURAGE the suggester to submit more ideas.

Source: National Association of Suggestion Systems.

Returns Dollar Dividends

(Annual costs and savings of a sample plan)

Awards paid out	$8,322
Committee's meeting time	1,311
Investigators' wages*	4,712
Director's wages†	2,740
Stenographic wages	2,020
Promotion & publicity	497
Other administrative	523
Total cost	20,125

Savings from ideas	$37,595
Less total cost	20,125
Net profit	17,470
Net profit per processed suggestion	$19.32
Net profit per adopted suggestion	83.59
Number of eligible employees	2,215

*Number of suggestions multiplied by average processing time (40 to 65 minutes is standard) gives hours spent.

†For the percentage of his time he spends on this job.

year's net savings. A few give 25 to 50 per cent. Some use gross savings as a base.

Awards for intangible ideas (like safety, housekeeping, quality) are harder to figure. Some companies set a minimum (about $10) and a maximum (around $100). A committee judges the amount of the award. Many allow exceptions to the maximum.

Many companies give merchandise awards for adopted ideas not worth $10. Eaton Mfg. Co. finds they are good for morale. They're presented when an idea: 1. Offers no tangible benefits but prompts management to make improvements. 2. Is impractical at present but may be considered in the future. 3. Is good but needs further analysis or explanation.

Some companies use a point system to evaluate intangibles. Points are awarded according to: 1. Seriousness of the problem. 2. Its frequency. 3. Number of persons or extent of operation affected. 4. Effectiveness of suggested solution. 5. Cost of application. 6. Ingenuity.

What's Supervisor's Role?—"He can be the key to a plan's success," says Howard W. Rider, communications director, Eaton Mfg. Co. "You should explain all phases of the plan to him in detail."

Arthur D. Murphy, director of safety and suggestion plans, Crucible Steel Co. of America, adds: "A suggestion plan can be an effective training aid. Supervisors who investigate the feasibility of adopting ideas learn a lot about their departments in the process. They have to dig into details they would not otherwise notice."

How do you keep supervisors interested? "Let them present the awards," answers Frank Carbon, suggestion manager, Cleveland Graphite Bronze Co., a division of Clevite Corp. "And keep the suggestion manager out on the floor as much as possible," he adds. A little good natured prodding often gets fine results.

F. A. Denz, director, Suggestions Div., Remington Rand Div., Sperry Rand Corp.: asserts: "Supervisors are our most important salesmen in getting the plan across to employees. A few minutes of their time each day selling it—keeping up the interest — that's the real catalyst for a successful program."

Need Top Aid?—The full support and continued interest of top management is necessary to a plan's success. To keep the big boss enthusiastic, give him: 1. Regular reports of results. 2. Information about plans of other companies. 3. A chance to occasionally participate in award ceremonies. 4. Selected examples of promotional material. 5. Proof that the plan makes profit. 6. Proof that it aids management activities like manpower utilization, work simplification, safety, community relations, recruitment.

Top management can give the plan a big push by: 1. Regularly (say twice yearly) writing letters to all employees asking their participation. 2. Urging middle management to give its support. 3. Discussing the program at staff and supervisory meetings. 4. Reviewing results periodically.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

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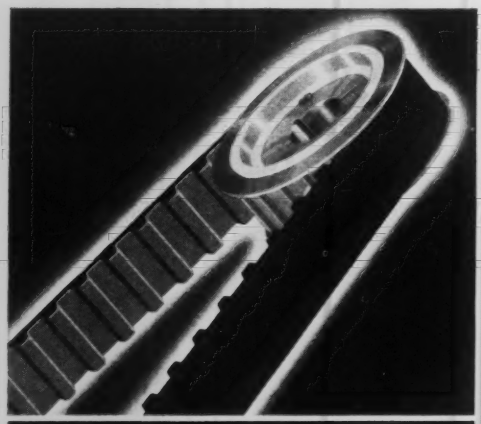

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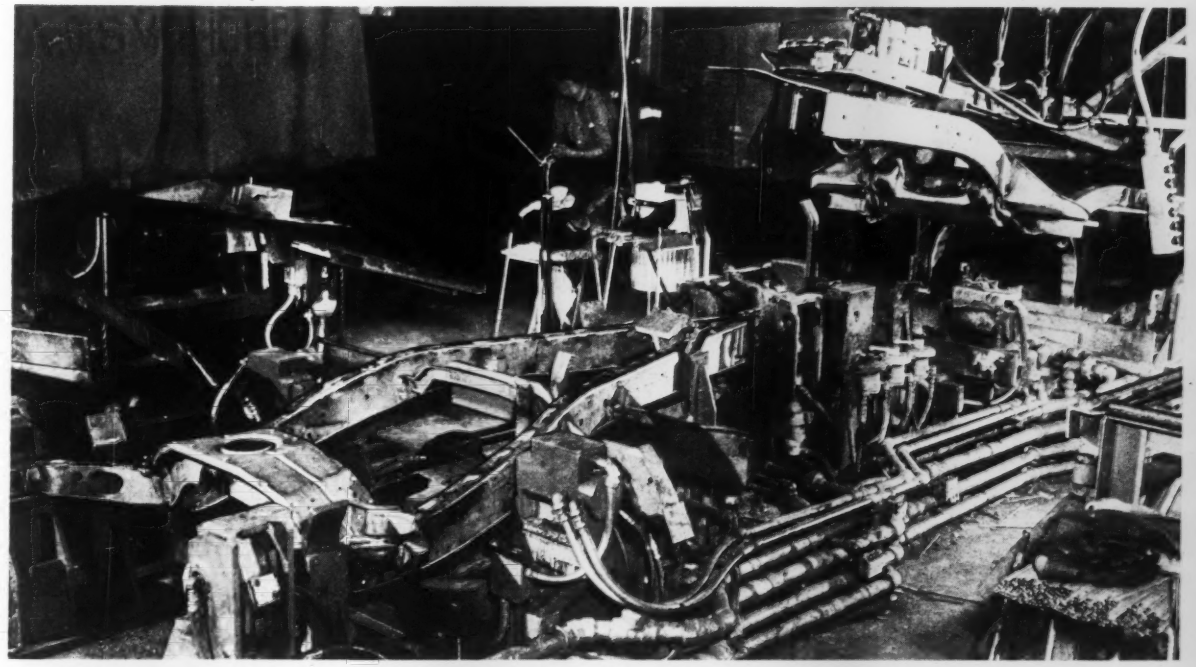

This marriage fixture shows how sections are joined as . . .

A. O. Smith Speeds Frames

PROJECT TEAMS are A. O. Smith Corp.'s answer for getting auto frame lines into production with the fewest possible headaches. The Milwaukee auto supplier has separate teams for Oldsmobile, Pontiac, and Cadillac lines.

James Jones, manager of the company's automotive division, puts it this way: "We keep the team patrolling the manufacturing area. The men can spot trouble signs and make corrections before the line gets snarled up."

Makeup—Each team is composed of five or six engineers. Torsten Rybeck heads up the project team on 1958 Pontiac frames.

For 1958, Pontiac switched to the tubular X-frame, first used on 1957 Cadillacs. GM's car division has six basic frame styles, one for each of its six car models. Each one is further adapted for air suspension.

Split Output—A. O. Smith makes the six basic frames and the air suspension job for Pontiac convertibles. Parrish Pressed Steel Div., Dana Corp., Reading, Pa., also makes the basic frames and five air ride models.

Changing from one frame to another requires readjusting jigs and fixtures and restocking the line with different brackets, hangers, and supports to be welded on the frame. Says Mr. Jones: "Changeover time takes 3 to 6 hours, depending on which type frame will be run next. Air ride models usually take slightly longer to change over."

Assembly—Front and rear sections of Pontiac frames are built up on parallel lines and joined in a marriage fixture before continuing on a single line.

Side rails are blanked and formed in another department, but many of the piercing operations are done at the start of the subassembly buildups. Changes in hole locations can be made on the spot instead of returning side rails to another department to be repierced.

Fixtures — As subassembly lines move the frames toward the marriage fixture, reinforcement pieces and body mounting brackets are welded into place. Mistakes in alignment of fixturing may cause a bracket to be welded to the wrong spot. Result: No place to put a body bolt when the car is assembled.

To avoid such problems, A. O. Smith uses hydraulic fixtures which exert up to 5000 lb of pressure on positioning clamps. If parts are off-size or not located correctly, the clamps will crush them so they can't be used.

Welding — Near the end of the subassembly lines, each half of the frame gets a tongue shaped metal junction plate welded to its center end. The front and rear sections move into a marriage fixture where the junction plates are welded together.

Close tolerance welding of outrigger brackets follows. The brackets support the rear axle drive bar; tolerance between it and the rear

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axle sway bar must be held to 0.045 in.

Up and Over—An elevator picks up the frames after this operation and banks four or five of them until they cool. The frames are then moved upstairs and slid into a turnover device which flips each one onto a walking beam transfer mechanism.

The walking beam swings them to the next station where they are lifted automatically about 6 ft into a welding booth for final work on the junction sections. Time needed for this operation is about 30 seconds.

Straightening — After final welding, inspection, and repair, the frames go to electronically operated straightening machines.

Sensing devices indicate how far each frame is out of line and relay this information through a drum switch which sets up correction relays. When proper relays are set, they actuate a hydraulic piston, which comes up (or sideways) to deflect the frame just enough to straighten it.

Sorting—Frames for all three GM division cars are painted on the same conveyor line. After painting, they are moved on overhead conveyors to a segregation loft.

As the frames move along in the segregation loft, identifying projections strike limit switches which cause them to be shunted into the proper collecting conveyor.

Autos Get Safety Probe

Car builders will either sponsor more driver and highway safety education or they'll be forced to do so by law. That's the feeling stemming from the Governors' Conference on Highway Safety. It met with car manufacturers in Detroit for three days last week.

The industry doesn't look kindly toward intervention of this sort. It spent the three days telling committee members that many years and many more dollars have been expended to make cars safer. The industry suggests that it might be the time for states to spend some time and money making safer highways and training better drivers.

Automakers Report—Harlow Curtice, General Motors' president, sums it up by asserting: "Until the millenium of the driverproof car is reached, we naturally are interested in public action to help our products move more safely. We need better licensing of drivers, more driver training, better enforcement, and more productive research on what makes drivers get into trouble behind the wheel."

Governors Comment—Gov. Abraham Ribicoff (D., Conn.), the committee chairman, agrees the industry isn't negligent, but thinks it can do more. One suggestion: Have each company donate funds to promote the use of seat belts. This project could be administered by the Automobile Manufacturers Association, Governor Ribicoff thinks.

Autodom's presidents appeared in uneasy truce to explain to the committee how and why cars are built as they are.

The Pitch—Ford Motor Co. went all out with crash impact tests. GM introduced its Unicontrol driving system (it has a single lever that controls steering, acceleration, and braking).

Chrysler Corp. discussed the history of auto safety engineering and said that lack of customer acceptance, not cost, prevents car builders from making all safety devices available as standard equipment. Chrysler studiously omitted references to aerodynamic stability of its fins—something that caused a few raised eyebrows in the '56 investigation.

Summary—Both sides came away assuring each other that more cooperation is needed and will be forthcoming. Both sides tend to be vague on what form the co-operation will take.

U. S. Auto Output

Passenger Only

	1958	1957
January	489,357	641,591
February	392,112	571,098
March	357,049	578,826
3 Mo. Total	1,238,518	1,791,515
April	.....	549,239
May	.....	531,365
June	.....	500,271
July	.....	495,629
August	.....	524,354
September	.....	284,265
October	.....	327,362
November	.....	578,601
December	.....	534,714
Total	.....	6,117,315

Week Ended	1958	1957
Mar. 15	86,447	141,038
Mar. 22	80,560	138,646
Mar. 29	93,844	130,233
Apr. 5	64,318	130,318
Apr. 12	84,207†	126,194
Apr. 19	74,000*	118,327

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Small Car Rumors Again

Small car talk is again rampant because of a rumor that Chevrolet plans to start small car buildups early in 1959 in two of its plants near Willow Run Airport outside Detroit.

GM claims the report (which comes from union sources) is strictly speculative, but the denial is so worded that industry observers suspect it has some basis.

As the story goes, the Chevy truck plant, now scheduled for "remodeling," will be used for assembly. Part of GM's transmission plant across the road will be used by Fisher Body Div. for body building.

Such activity indicates GM might make its bid with the small car reportedly being tooled by its Holden subsidiary in Australia. This is the only small car GM has that's far enough along to hit the 1960 model market.

Competition—It also means pressure will be on Ford Motor Co. to speed up its small car plans. Activities at Lincoln's Novi, Mich., plant have been carefully guarded, but there was a report last week that the company has decided on a rear end drive job with an integrated body (Ford is considering several versions of front and rear drive). But the company has been blowing hot and cold like this for several months.

Chrysler has emphatically squelched talk about using Kaiser-Willys Aerocar dies. It still has no definite small car plans but has decided Europe is its best bet to find a competitive model. Chrysler, however, is more interested in the foreign export market than in domestic sales.

The catalyst: Rambler sales are close to 70 per cent above year-ago levels. George Romney, American Motors president, announces AMC is boosting Rambler production from 600 to about 660 daily. The company will hire 400 more workers for its Wisconsin plants.

Feeling "profit pinch"?

Talk to

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COLD HEADING: A WAY TO CUT UNIT COSTS

- **Eliminates extra operations; faster than forging**
- **Metal flows to shape — without waste, without machining costs**

Here's a manufacturing fact often overlooked: The same machines that spill out large volumes of standard fasteners at surprisingly low cost can also produce *special* mechanical parts . . . also in volume and also at low cost.

It's surprising what an *expert* can do with cold heading machines. Some parts that would otherwise be two or more pieces are turned out as uniform, integral units. Parts that would otherwise require slower, costlier machining spout from the cold header with little or no scrap loss. What's more, the pieces are stronger.

Case Histories: (1) Eliminating double forging operation, high speed cold heading machine cuts and bends lengths from continuous rod to form shifter lever. It also gives greater strength, improved finish, closer tolerances. (2) Instead of a machined screw assembled with separate stamped screw driver shield, hose clamp screw is now cold headed in one piece. (3) No longer cut on screw machine, insert screw for plastics costs 40% less. Cold header uses just amount of metal required.

Call on the RB&W Fastener Man. He can tell you whether or not cold heading is feasible for producing your screw machine parts, forgings and small assemblies. If so, RB&W facilities can handle your volume needs. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.

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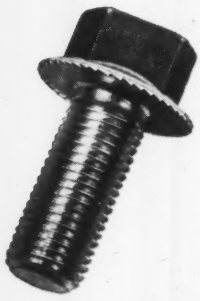
113th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Fargo. **Distributors from coast to coast.**



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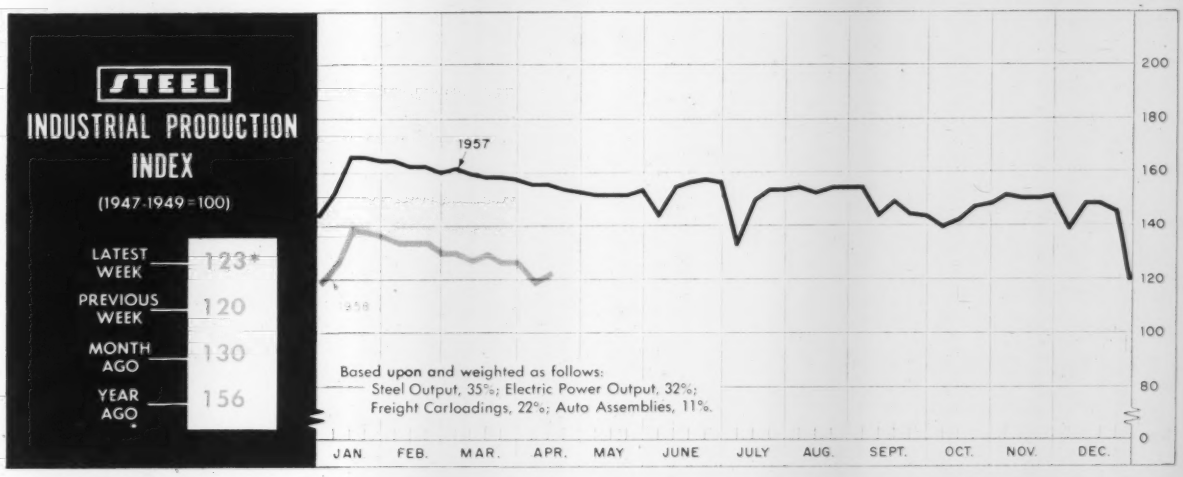
Available with plain flange, or SPIN-LOCK design.

RB&W FASTENERS—STRONG POINT OF ANY ASSEMBLY



*Week ended Apr. 12.

FRB Index Likely To Continue Downtrend

LOOK for the Federal Reserve Board's industrial production index to continue its decline in April. The seasonally adjusted indicator fell 2 points in March, hitting 128 (1947-49=100). Another drop of 1 or 2 this month would not be surprising. And right now, it doesn't look like that will be the end of the downtrend in the seasonally adjusted version of the index.

This does not mean that there won't be any improvement in the industrial picture this spring—there may be a slight upturn. Many businessmen report whisperings of better things ahead. But they are accustomed to more of a shout at this time of year, and few persons are stuffing cotton in their ears in anticipation of such a din.

Forerunner—The basis for this dismal forecast can be found in STEEL's industrial production index (above). Last year, between March and April, that trend line dropped from a monthly average of 160 to 155 (1947-49=100). The FRB index dipped from 145 to 144. On the basis of figures for two weeks, April's slide this year will be even steeper, going from March's average of 128 to a preliminary 122. Some of this decline may be explained by the FRB on the basis of greater than usual observance of Good Friday as a holiday.

Taking into account the seasonal factor, it looks as if the FRB index could plummet to 123 before the summer is over. That was the low point of the 1954 recession, which started from a much lower point than this one did.

Right Focus—But the economy is not going to hell in a handbasket. These barometers are pretty well attuned to the hard goods segment of the economy, which is bearing almost all the brunt of the down cycle. Even within this segment there are different levels of recession. Some industries are almost scraping bottom. Machine tool orders during the first two months of 1958 are off 62.6 per cent from

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,283[1]	1,308	2,313
Electric Power Distributed (million kw-hr)	11,400[1]	11,326	11,695
Bituminous Coal Output (1000 tons)	6,180[1]	7,210	8,306
Crude Oil Production (daily avg—1000 bbl)	6,250[1]	6,250	7,442
Construction Volume (*ENR*—millions)	$354.6	$398.5	$344.5
Auto, Truck Output, U. S., Canada (*Ward's*)	110,032[1]	87,870	160,369
TRADE			
Freight Carloadings (1000 cars)	325[1]	316	674
Business Failures (Dun & Bradstreet)	352	327	231
Currency in Circulation (millions)[3]	$30,744	$30,636	$30,655
Dept. Store Sales (changes from year ago)[3]	+11%	+2%	+8%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$19,324	$20,382	$20,405
Federal Gross Debt (billions)	$272.3	$272.6	$274.5
Bond Volume, NYSE (millions)	$25.3	$18.7	$23.9
Stocks Sales, NYSE (thousands of shares)	10,376	8,638	11,989
Loans and Investments (billions)[4]	$89.2	$89.8	$87.3
U. S. Govt. Obligations Held (billions)[4]	$28.1	$28.1	$26.6
PRICES			
STEEL's Finished Steel Price Index[5]	239.15	239.15	227.41
STEEL's Nonferrous Metal Price Index[6]	195.9	195.9	239.4
All Commodities[7]	119.6	119.6	117.2
Commodities Other than Farm & Foods[7]	125.8	125.9	125.3

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1958, 2,699,173; 1957, 2,559,490. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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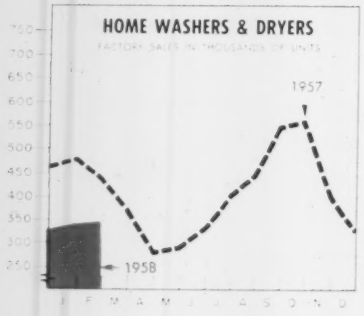
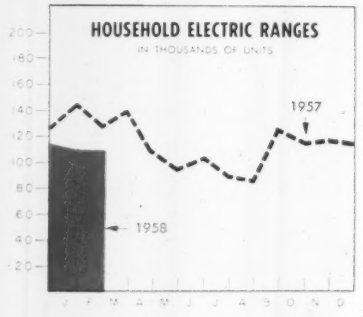
THE BUSINESS TREND



	Washers		Dryers	
	1958	1957	1958	1957
Jan.	238,153	331,314	98,630	144,621
Feb.	263,009	319,580	78,578	114,517
Mar.	.....	286,205	.....	83,668
Apr.	.....	230,675	.....	42,850
May	.....	254,195	.....	31,572
June	.....	282,289	.....	46,783
July	.....	335,139	.....	70,011
Aug.	.....	329,046	.....	116,601
Sept.	.....	384,299	.....	164,468
Oct.	.....	369,487	.....	185,772
Nov.	.....	260,460	.....	141,663
Dec.	.....	206,787	.....	118,116
Totals	.....	3,589,476	.....	1,260,642

American Home Laundry Mfrs. Assn.

Charts copyright, 1958, STEEL.



	Total Factory Sales—Units		
	1958	1957	1956
Jan.	109,000	144,500	143,600
Feb.	108,700	127,700	161,400
Mar.	.....	139,400	163,100
Apr.	.....	107,200	157,500
May	.....	93,600	128,400
June	.....	102,300	129,800
July	.....	88,700	121,500
Aug.	.....	85,800	97,500
Sept.	.....	124,800	129,300
Oct.	.....	114,200	116,200
Nov.	.....	116,800	110,200
Dec.	.....	113,800	126,500
Totals ...	.....	1,358,800	1,585,000

National Electrical Mfrs. Assn.

those of the year-ago period. The report for March probably will show a slight improvement over the February figures, but not enough to crow about.

In the middle are such industries as automotive and appliances. First quarter auto production was off 31 per cent from the year-ago total. Appliance production is running 15 to 30 per cent behind, depending on the product and the company.

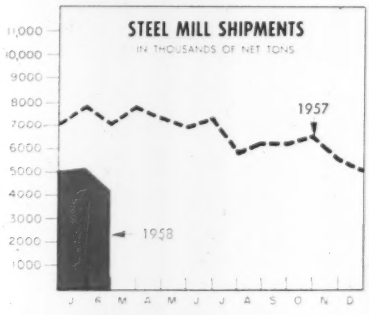
On top is the construction industry, although it, too, has its soft spots. Construction put in place during the first quarter totaled about $9.7 billion, slightly ahead of the 1957 pace. Highway construction and public works are equalizing these cutbacks in industrial work.

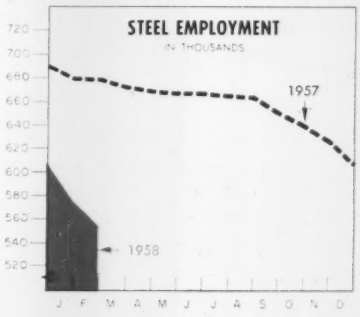
Other Side—Outside the metalworking industries, the recession is being felt less—hardly at all in many sectors. Nondurable goods production, as measured by the Federal Reserve Board, is only 5.3 per cent below what it was a year ago, compared with 17.2 per cent for durable goods output. Consumer buying is holding up remarkably well. Department store sales are nearly even with the 1957 level to date. The service segment of the gross national product is expected to continue its growth, even though at a slightly lower rate than anticipated earlier in the year.

Over-All Construction Up

It has been said that this country has never suffered a serious depression during a construction boom. This year should put that generalization to a severe test. The construction boom is still on, as evidenced by the figures mentioned above. While physical volume of work put in place may not quite measure up to the 1957 total, it isn't off enough to warrant the "sick" label for this industry.

And contracts being let indicate that this strength will continue for some time. *Engineering News-Record* reports that contracts for heavy construction in March totaled $1.4 billion, marking the third consecutive monthly increase. This strength is carrying over into April. Awards during the week ended Apr. 10 came to $354.6 million. This was the third week in a row which topped the corresponding period of 1957, bringing the cumulative total for 1958 within 8 per cent of the year-ago figure. At the end of February, the gap was 16 per cent.





	Net Tons		
	1958	1957	1956
Jan.	5,215,819	7,809,451	7,587,870
Feb.	4,262,935	7,066,732	7,468,393
Mar.		7,821,616	8,255,824
Apr.		7,349,752	7,783,873
May		6,972,091	7,764,776
June		7,284,616	8,077,805
July		5,877,133	1,288,988
Aug.		6,229,853	5,539,915
Sept.		6,171,674	7,058,028
Oct.		6,550,690	7,930,957
Nov.		5,606,018	7,431,136
Dec.		5,092,913	7,064,093

American Iron & Steel Institute.

	Employment in Thousands		Payroll in Millions	
	1958	1957	1958	1957
Jan.	575	678	$297.4	$360.4
Feb.	554	677	261.7	327.5
Mar.		671		344.2
Apr.		668		331.5
May		666		338.0
June		666		324.8
July		665		334.6
Aug.		663		343.7
Sept.		651		330.1
Oct.		640		345.6
Nov.		626		316.3
Dec.		606		299.6

American Iron & Steel Institute.

Layoff Put Off

Some of the best news appliance makers have heard for some time came out of Columbus, Ohio, last week. Westinghouse Electric Corp. canceled its plans to lay off 600 to 800 workers at its big appliance plant there. A slight increase in orders prompted the action. Officials are cautious about calling it a turn in the trend. The plant had been closed for a week, during which time the workers voted to go on a five-day week and to reduce the workforce rather than cut back to a four-day week at full force. The reduction in the workforce was canceled.

But the industry has a long way to go to match the year-ago pace (see charts on Page 76). Among the major appliances charted by National Electrical Manufacturers Association, only electric food waste disposers showed improvement over the year-ago period during February (the latest monthly figures available). For the first two months of 1958, only water heaters show an advantage over the corresponding period of 1957, NEMA reports. This may reflect the optimism over housing starts this year.

Members of the Gas Appliance Manufacturers Association are counting on enough improvement in the housing industry to add 20,000 jobs and an extra $100 million to their payrolls just to keep up with the heavier demand for appliances. "The fact that first-quarter sales of gas kitchen, laundry, and heating equipment exceeded last year's figures proves that housing demand has held firm," declares Harold Massey, managing director of GAMA. "The latest government moves to spur both private and public home starts may bring this year's new-dwellings total to more than 1.2 million."

Trends Fore and Aft

- Business failures are likely to set records this year. March ran about 11.5 per cent ahead of the corresponding month last year, and the trend is continuing into April.
- One bright spot in steel consumption is the canmaking industry. Manufacturers' shipments of cans in February rose 8.9 per cent over the February, 1957, mark. The industry consumed 305,322 tons of steel, an increase of 24,875 tons over the figure for last year's month, reports the Can Manufacturers Institute.

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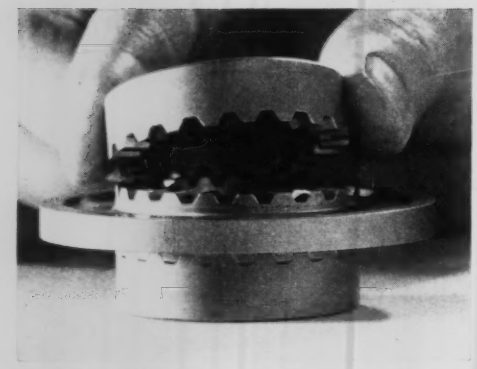

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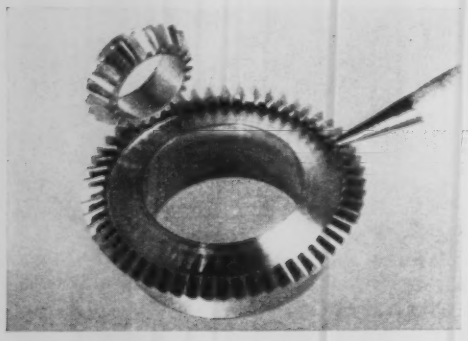
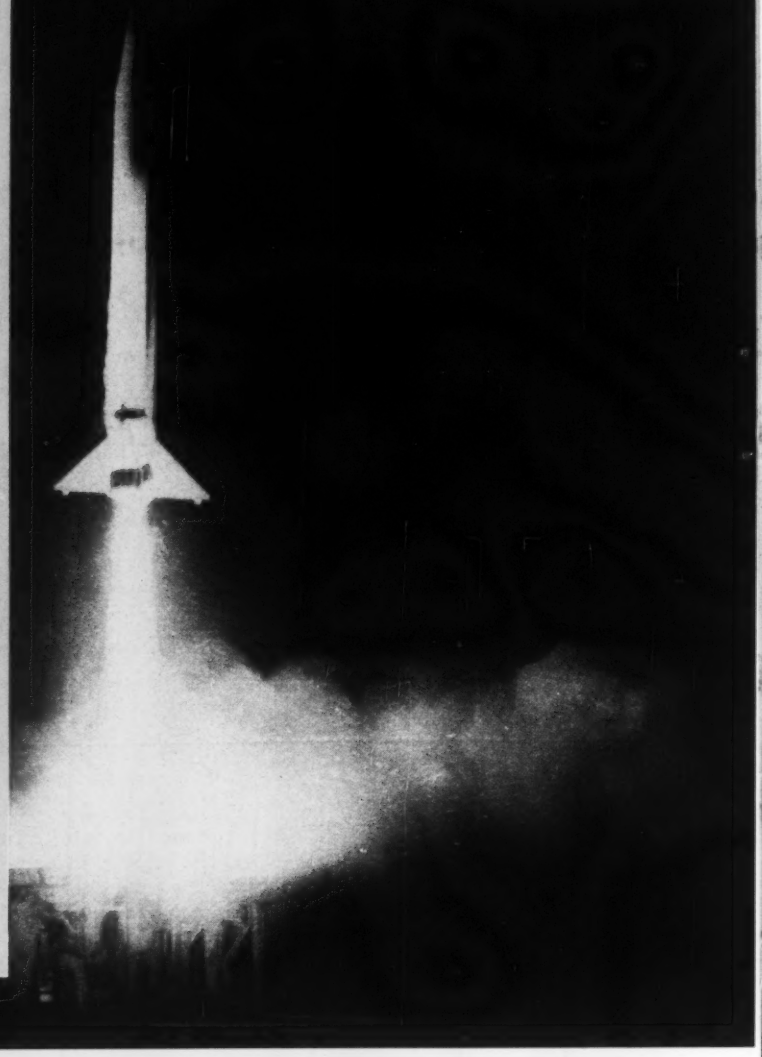


BEVEL GEARS



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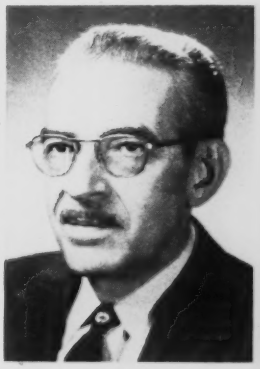
ROBERT W. EAGER
Joy manufacturing manager

LLOYD M. GRIFFIN
joins Amweld



JOSEPH O. WILLCOX
DeWalt production supt.

Oliver J. Brown Jr. was appointed manager of continuous equipment sales, **Hanson - Van Winkle - Munning Co.**, Matawan, N. J. He was in charge of engineering for the continuous strip plating and cleaning systems.

Robert W. Eager was appointed manufacturing manager of **Joy Mfg. Co.**, Pittsburgh. He was works manager at the New Philadelphia, Ohio, plant.

I. Newton Becker, formerly vice president-operations, fills the new post of executive vice president at **American Machine & Metals Inc.**, East Moline, Ill. **Philip C. Clarke** was elected vice president AM&M and general manager of its new **Hunter Spring Div.** at Lansdale, Pa. Hunter Spring was formerly an AM&M subsidiary, of which Mr. Clarke was executive vice president.

On the staff of **J. M. Cook**, vice president-marketing, **Cutler-Hammer Inc.**, Milwaukee, are: **E. B. Fitzgerald**, apparatus sales manager; **F. A. Wright**, general sales manager; **R. C. Monahan**, marketing research manager; **H. B. Phillips**, quantity sales consultant.

Max de Haas was appointed vice president-engineering by **Youngstown Foundry & Machine Co.**, Youngstown. **Axel S. Hellstrom** was made chief engineer; **Frank J. Gentile**, assistant chief engineer; **Walter M. Keil**, chief design engineer, roll turning and contouring lathes; **Stephen Poleschuk**, chief design engineer, extrusion presses.

Lloyd M. Griffin joined **American Welding & Mfg. Co.**, Warren, Ohio, as director of product planning. He will work with the Warren and Niles, Ohio, divisions. Mr. Griffin was with Booz, Allen & Hamilton, management consulting firm.

Owen K. Moynihan was made assistant superintendent of the cold strip department at **Wheeling Steel Corp.'s** Steubenville, Ohio, Works. He was superintendent-cold strip department, at the Yorkville Works.

Maurice K. Brown was elected vice president-sales, **Penn Metal Co. Inc.**, Boston. He was general sales manager.

William M. Baker was made sales manager, **Cardinal Scale Mfg. Co.**, Webb City, Mo. He was sales representative of Flint Steel Corp.

James A. Glunt was made chief metallurgist, **Alan Wood Steel Co.**, Conshohocken, Pa. He was assistant chief metallurgist, Cleveland Works Div., Jones & Laughlin Steel Corp.

Schuyler C. Reber was promoted to vice president in charge of the automotive division, **Rotary Lift Co.**, Memphis, Tenn., division of Dover Corp. He is succeeded as sales manager by **Charles W. Collier**, former district manager.

Richard W. Hampel was elected vice president, machine division, **Woodruff & Edwards Inc.**, Elgin, Ill. He was superintendent of the division.

Joseph O. Willcox was appointed production superintendent, **DeWalt Div.**, Lancaster, Pa., American Machine & Foundry Co.

O. Franklin Frost was made equipment sales manager, **AC Spark Plug Div.**, Flint, Mich., General Motors Corp. He succeeds **K. K. McGarvey**, who is on special assignment prior to retirement in September.

Michigan Forging Co., Dearborn, Mich., appointed **W. Clair Shaffer** executive vice president; **Crispen M. Hammond**, secretary; **Robert W. Stich**, plant manager; **G. William Duffield**, sales manager.

O. Wayne Carrico was made vice president-general manager, automotive division, **Rheem Mfg. Co.**, Fullerton, Calif. He has been general manager since last August.

Henry Zaccaria was made manager of the purchasing department, Philadelphia plant, for **International Resistance Co. Edgar M. Corson Jr.** was made sales manager, computer components division.

John R. Devitte was made director of purchasing; Attorney **Dean M. Hennessy**, secretary of **Reflectal Corp.**, Chicago, subsidiary of Borg-Warner Corp.

Fred K. Powell Jr. was appointed to head the defense products program at **American Machine & Foundry Co.**, New York. Mr. Powell is vice president and has been head of the engineering division. **Lt. Gen. Laurence C. Craigie**, USAF, ret., also an AMF vice pres-

PAUL W. BEAMER

DR. EUGENE S. MACHLIN

Utica Metals Div. positions

GERALD F. GRACE

EDWARD J. BYRNE

Columbus McKinnon Chain sales mgrs.

ident, will supervise the ballistic missiles program. He will remain in Los Angeles.

Paul W. Beamer was made manager, sales and development, **Utica Metals Div.**, Kelsey-Hayes Co., Detroit. He was manager of metallurgical development and research at Austenal Inc. **Dr. Eugene S. Machlin**, on sabbatical leave from his post as associate professor of metallurgy, Columbia University, was appointed acting director of research, Utica Metals.

Donald W. Johnson was named manager of **Reynolds Metals Co.'s** aluminum reduction plant at Longview, Wash. He succeeds **V. G. Kneeskern**, who was named manager of Reynolds' St. Lawrence reduction plant at Massena, N. Y., now under construction.

J. Elmer Forrest was made general sales manager, mechanical products, **Diamond Power Specialty Corp.**, Lancaster, Ohio. He was assistant sales manager.

Columbus McKinnon Chain Corp., Tonawanda, N. Y., appointed **Gerald F. Grace** sales manager, industrial chain division; **Edward J. Byrne**, sales manager, Chisholm-Moore Hoist Div.

Bertram J. Milleville was named director of engineering and research, heading the product development program at **Ohio Injector Co.**, Wadsworth, Ohio. He served in a similar post at Edward Valves Co.

Surface Combustion Corp., Toledo, Ohio, appointed **Don Beggs** manager of engineering for the furnace divisions; **O. E. Cullen**, manager of the research and development department; **E. W. Weaver** to staff assistant to the vice president-engineering; **J. Montagino** to chief engineer, special heat treat division.

Pete Lindsay was made marketing manager, **Pheoll Mfg. Co.**, Chicago.

George L. Nankervis Co., Detroit, appointed **C. James Civan** manager of its metal finishing systems division. **Angelo Giaier** was made chief engineer, succeeding Mr. Civan.

Charles A. Liming was made sales manager, electrical apparatus division, **Hubbard & Co.** He has headquarters at the new Hubbard electrical research laboratory at McCook, Ill.

Pheoll Mfg. Co. appointed **Jack Lewis** sales manager for its new impact extrusion plant in Michigan City, Ind.

Sheldon Detwiler was named manager of electronic engineering, **Lewyt Mfg. Corp.**, Long Island City, N. Y. He was in charge of data processing systems.

Eugene R. Hausrath was named Cleveland district manager, **Shepard Niles Crane & Hoist Corp.** He succeeds **Harry A. Baugh**, retired.

Harold Michel was elected vice president-sales of the newly formed **Midco Valve & Fittings Inc.**, Evanston, Ill. He has been with the

DONALD W. JOHNSON

Reynolds reduction plant mgr.

J. ELMER FORREST

Diamond Power Specialty post

C. JAMES CIVAN

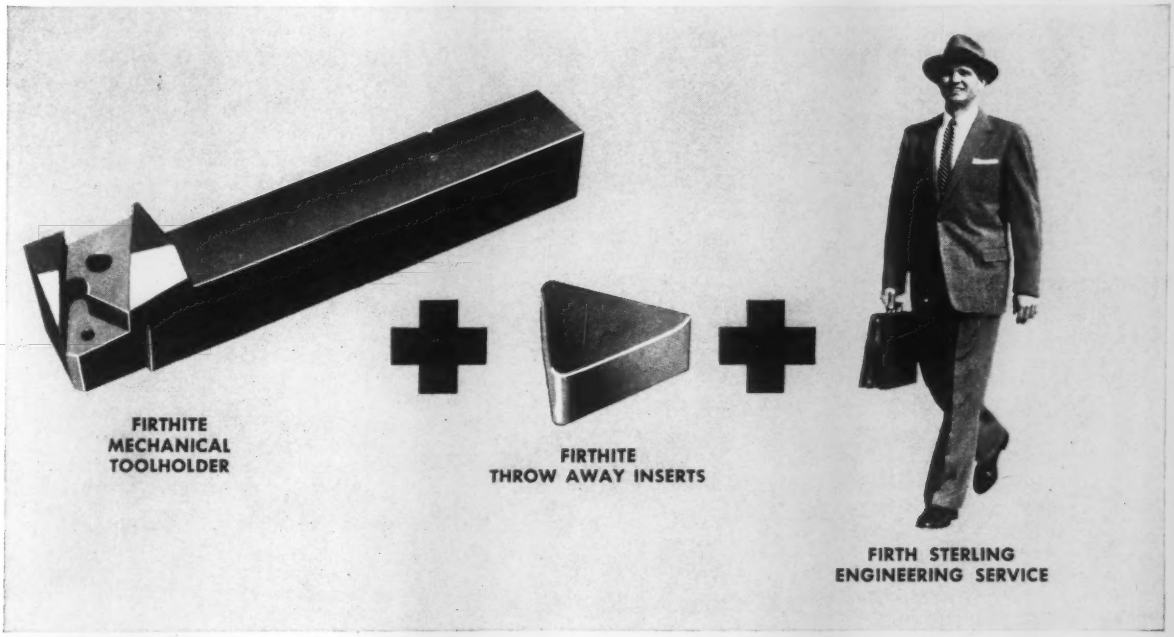
Nankervis div. manager

HAROLD MICHEL

Midco Valve & Fittings v. p.

Firth Sterling . . .

PIONEER IN POWDER AND MOLTEN METALLURGY



TOOL UP FOR ECONOMY

with this cost-cutting combination

There are two important reasons why thousands of metalworking plants are cutting costs with Firth Sterling mechanical toolholders, throw away inserts and engineering service. First, the broad experience and expert application knowledge of Firth Sterling engineers (yours at no cost) help you plan your tooling program for maximum savings. Second, in this complete line, Firth Sterling has toolholders and inserts—*exactly* right for *your* job:

THRIFTOOL—lowest cost toolholder made. Offers chipbreaker, rigid insert and rapid indexing for reduced set-up time.

ECONODEX—medium priced holder is ideal for jobs requiring positive rake. Carbide anvil and carbide chipbreak clamp assure long life.

MECHANIDEX—for heavy-duty machining. Adjustable chipbreaker offers extreme versatility, allowing top and bottom indexing of inserts.

FIRTHITE INSERTS—most precise dimensionally—are available in a full range of Carbide grades and the new Firthite Cermet WF Grade. *Now available for the first time, high speed steel throw away inserts in two of Firth Sterling's top cutting grades—Circle C and Van Chip.*

To get help with *your* tooling problem from a Firth Sterling engineer, simply call your nearest Firth Sterling sales office or distributor. And for further information on Firth Sterling toolholders and inserts, write for descriptive bulletin MTI-3: FIRTH STERLING, INC., Dept. 100, 3113 Forbes St., Pittsburgh 30, Pa. Offices and warehouses in principal cities.

Visit our booth at the
A.S.T.E. Show in Philadelphia—Booth 202

PRODUCTS OF *Firth Sterling* METALLURGY

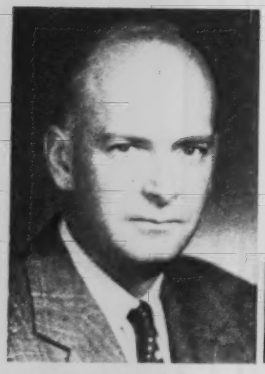
HIGH SPEED STEELS • TOOL & DIE STEELS • STAINLESS SPECIALTIES • HIGH TEMPERATURE ALLOYS
SINTERED TUNGSTEN CARBIDES • HEAVY METAL • CERMETS • CHROMIUM CARBIDES
ZIRCONIUM • TITANIUM • STERVAC & STERCON SUPER ALLOYS

FIRTH STERLING TRADE MARK

EDWARD L. BATES
Fostoria Pressed Steel pres.

RUSSELL T. JONES
Crucible mill supt.

JOSEPH L. PULLIAM
Micromatic Hone sales mgr.



D. CAMERON BRADLEY
Metals Disintegrating v. p.

HERBERT A. BEYER JR.
DeVlieg v. p.-sales

ALLAN C. JOHNSTON
Robins Conveyors post

parent company, Midcontinent Tube Service Inc.

D. Cameron Bradley was elected vice president, **Metals Disintegrating Co. Inc.**, in charge of its pulverizing machinery division at Summit, N. J. He has been assistant secretary of the company and general manager of the division.

Herbert A. Beyer Jr. was named vice president-sales, **DeVlieg Machine Co.**, Ferndale, Mich. He was sales manager.

W. T. Ellison was appointed chief engineer, **Michigan-Standard Alloy Casting Co.**, Detroit.

Zurn Industries Inc., Erie, Pa., appointed **Robert H. Shenk** vice president and technical director.

William R. Johnson was made assistant director of research and development for **Associated Spring Corp.**, Bristol, Conn. He was chief research metallurgist at its research center.

Allan C. Johnston was appointed production superintendent, **Robins Conveyors Div.**, Hewitt-Robins Inc., Passaic, N. J.

Frank A. Sullivan, sales manager of industrial and commercial lighting for Wheeler Reflector Co., Boston, was appointed general sales manager of industrial and commercial lighting for both **Wheeler Reflector Co.** and **Fullerton Mfg. Corp.**, newly combined divisions of Franklin Research Corp., Boston.

Robert F. Kehrer was made industrial parts manager, **J. I. Case Co.**, Racine, Wis. He has been acting assistant parts manager since he joined Case last May. He formerly served as manager of parts pricing, listing, and specifications departments at Massey-Harris-Ferguson Inc.

A. M. Klinger was named sales manager of material handling products at **Ingersoll Kalamazoo Div.**, Kalamazoo, Mich., Borg-Warner Corp.

Edward L. Bates, vice president-sales, **Fostoria Pressed Steel Corp.**, Fostoria, Ohio, was elected president to succeed **Russell J. Carter**, now chairman. **I. J. Barber** was elected vice president; **R. H. Carter**, vice president and secretary.

Russell T. Jones was appointed superintendent of the 10-12-14 inch mill at **Crucible Steel Co. of America's** Midland, Pa., Works. He was assistant superintendent - rolling mills at Republic Steel Corp.'s Youngstown plant. **Harlan W. Diefendorf** was made superintendent of melting at the Sanderson-Halcomb Works, Syracuse, N. Y.

Joseph L. Pulliam was made sales manager, **Micromatic Hone Corp.**, Detroit. He was north central regional manager.

Frank E. Hawley Jr. was made manager of **Wheeling Steel Corp.'s** sheet sales division, Wheeling, W. Va. He succeeds **Luther L. Jaynes**, retired.

OBITUARIES...

Harold C. Boyd, 60, vice president, **Virginia Steel Co. Inc.**, Richmond, Va., died Apr. 7.

Bernard J. Secor, 55, vice president, **Great Lakes Stamping & Mfg. Co.** and **Toledo Guild Products**, Toledo, Ohio, died Apr. 7.

William J. Cook, 68, retired president, **Hunter Spring Co.**, Lansdale, Pa., died Apr. 6.

George Georgeson, secretary-treasurer, **Atlas Forgings Co.**, Cicero, Ill., died Apr. 3.

Frank H. Adams, 72, president, **Surface Combustion Corp.**, Toledo, Ohio, died Apr. 6.

John S. Coleman, 60, president, Burroughs Corp., Detroit, died Apr. 13.

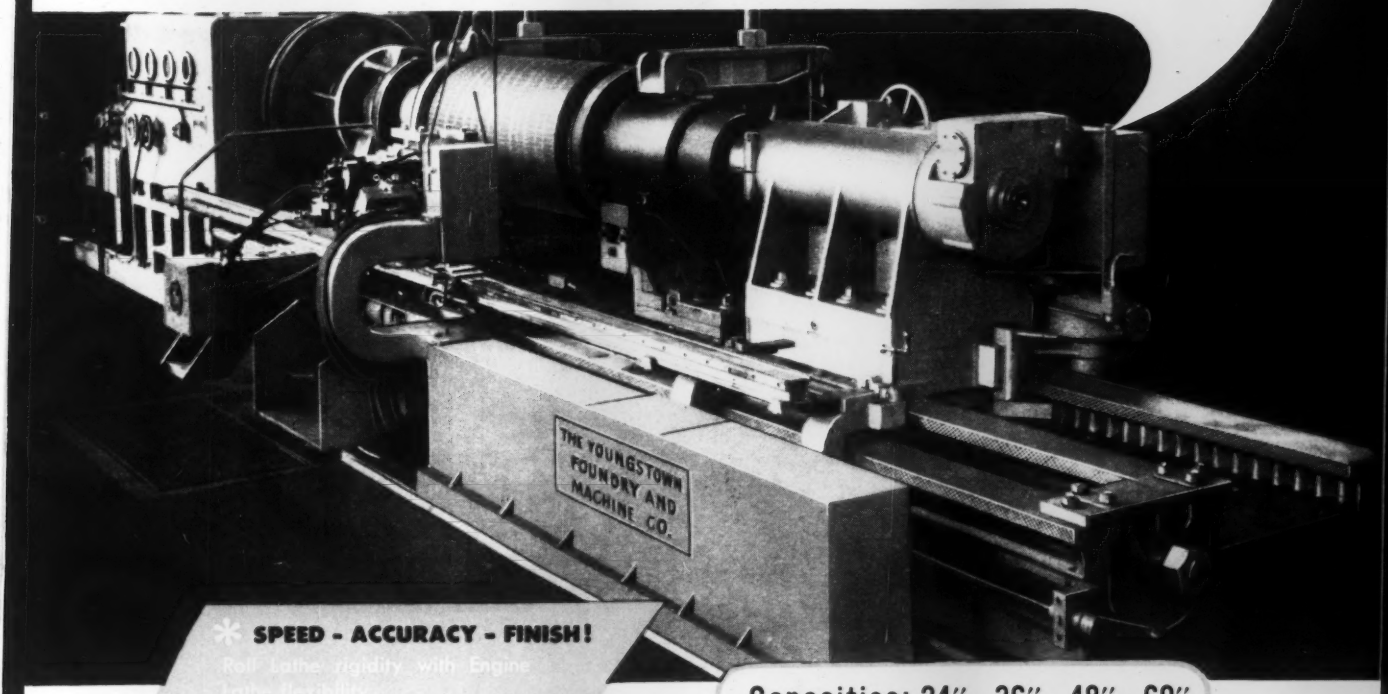
George R. Haskins, 39, president, **R. G. Haskins Co.**, Chicago, died Apr. 7.

Heber H. Tullis, 56, former administrative vice president, **Armco Steel Corp.**, Middletown, Ohio, died Apr. 14.

James A. Scully, 81, founder and chairman, **Scully-Jones & Co.**, Chicago, died Apr. 6.

tomorrow's design in today's

Now "YOUNGSTOWN" Contour Roll Lathes



*** SPEED - ACCURACY - FINISH!**
Roll Lathe rigidity with Engine Lathe flexibility

Capacities: 24" - 36" - 48" - 60"

*** NEW HYDRAULIC TRACER**
controlled automatically. Front mounted tracer and templet for operating ease and faster set-up

*** NO FACEPLATE OVERHANG!**
Faceplate supported by extra large Timken roller bearings mounted on extra large torque hub to carry heavy radial and thrust loads

*** NEW TOOL POST & CARRIAGE**
designed for either single point carbide-tipped tools or regular roll turning tools

*** RUGGED HEAD STOCK!**
Herringbone gearing; automatic lubrication; illuminated inspection ports

Turn rolls better and faster with Automatic Tracer Control

Far ahead in design and efficiency, this new roll lathe has been developed to turn rolls better and faster . . . either on necks or centers . . . from the smallest bar mill roll to the largest back-up roll. Tested and proved in our own roll shop. Capacities to meet your specific needs.

The 48" roll lathe pictured has a speed range of 1.40 RPM to 81.1 RPM. Roll capacities: 18" minimum diameter, 50" maximum diameter, with 20'0" maximum length. Hydraulic ragging attachment can be furnished, as illustrated. Tell us your requirements . . .

Write for Complete Information

The Youngstown Foundry & Machine Company

Serving Industry Since 1885

Youngstown 1, Ohio

HEAVY MACHINERY • AUXILIARY EQUIPMENT • CASTINGS • ROLLS

"YF&M" builds the best of them

PIH

Pittsburgh Induction Heating Company Incorporated

Send for detailed brochure with frequency graph on Induction Heating

ONLY PIH OFFERS A ONE-YEAR WARRANTY

You get the best when you buy a PIH induction heating furnace designed and pre-tested prior to delivery to meet your specific needs. PIH furnaces have a wide range of ferrous and non-ferrous applications, can cut your costs and operating time, increase profits. Consult a PIH Engineer, learn the advantages of induction heating for optimum heating of all metals for extrusion, forging, rolling, annealing and other purposes.

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Saskatchewan May Get New Steel Mill

Canadians propose $15-million facility at Regina to supply skelp and other products to fabricators in that area. Availability of scrap is big question mark

A $15-MILLION steel plant may be erected by Canadian interests at Regina, Sask. A major attraction is a virtually built-in market for skelp for pipe at Prairie Pipe Mfg. Co.'s new plant in that city. The firm is purchasing all its skelp now from three eastern Canadian steel companies.

The other major outlets would be to a wide range of fabricators who now obtain their steel requirements from rolling mills in Alberta and Manitoba, or from plants of basic producers in eastern Canada.

Enough Scrap?—Final decision to build hinges to a large extent on results of a survey of the scrap supply potential within the economic marketing area of the site.

Prime mover in the project is J. W. Sharp, Prairie Pipe's president and general manager.

The pipe mill alone could provide a market for 50,000 to 70,000 tons of steel annually, depending on the number and length of oil and gas pipeline projects.

A strong market guarantee in this case is the contract the pipe mill has to supply bulk of the gas pipeline requirements of the government-owned Saskatchewan Power Corp. That firm is growing vigorously, pushing gas transmission and distribution lines to many parts of the province. The 1958 program, for instance, calls for construction of 250 miles of main gas transmission line, virtually all of which is expected to be built with pipe from Prairie. The company has boosted the diameter range of its pipe to 16 in.

Completes Bar Mill Project

Pittsburgh Steel Co. has begun operating its new billet cooling installation. The yard is the final phase of a $2.5-million rebuilding of the company's 18-in. bar mill at Monessen, Pa. It will be combined with a new $6 million, 30 in. continuous billet mill which is scheduled to be completed in late July or early August. Revamping both mills came under a $20.5 million cost reduction project undertaken in 1955.

Forms Canadian Branch

National Electric Products Corp., Pittsburgh, formed a subsidiary, Nepco of Canada Ltd. with plant and offices in Woodstock, Ont. The plant is National's first manufacturing facility outside the U. S. Operations are scheduled to begin this month.

Railroad Uses Aluminum

Aluminum roofs are in service on 300 boxcars of Grand Trunk Western Railway. They were fabricated by Pullman-Standard Car Mfg. Co. from sheets supplied by Aluminum Co. of America.

Dravo Buys Graham Works

Dravo Corp., Neville Island, Pittsburgh, purchased the shops and land of Pittsburgh Screw & Bolt Corp.'s Graham Works on that island. The property includes about 40 acres of land, 260,000 sq ft of shop floor space, and 7000 sq ft of office floor space. Pittsburgh Screw & Bolt is transferring operations from its three Pittsburgh plants to a new plant near Mt. Pleasant, Pa.

Increases 1000 Per Cent

Purchase of a new 100,000 sq ft plant in Los Angeles marked the first step in the reorganization of Turbo-Cast Inc., Los Angeles. Reorganization is aimed at increasing the foundry's capacity 1000 per cent. Its production is concentrated in high temperature, cast steel applications.

Motormakers May Merge

Ohio Electric Mfg. Co., Cleveland, and Howell Electric Motors Co., Howell, Mich., may merge. If approved by stockholders next month, the combination will operate as the Howell Electric Motors Co. under the direction of Chester Bland as chairman and A. C. Flood as president.

Westinghouse Expands

Westinghouse Electric Corp., Pittsburgh, will build a 40,000 sq ft addition to its Standard Control Div. plant at Beaver Falls, Pa. The company also announces establishment of its defense products headquarters at 1000 Connecticut Ave. N.W., Washington, D. C. Maj. Gen. Albert Boyd (USAF, ret.) is vice president-defense products.

Sign Licensing Agreement

Consolidated Electrodynamics Corp., Pasadena, Calif., and Hitemp Wires Inc., Westbury, N. Y., have signed a licensing agreement giving Hitemp the right to make and market ceramic-coated wire using Ceramicite, an insulating material developed by Consolidated.

Lets Expansion Contracts

Dunkirk Radiator Corp., Dunkirk, N. Y., awarded contracts for a $175,000 addition to its plant. It will be used for housing production stamping facilities to make jackets for boilers.

Firms Announce New Names

Standard Enameling Co., Culver City, Calif., a wholly owned subsidiary of Rheem Mfg. Co., Chicago, changed its name to **Wedgewood-Holly Corp.** The subsidiary makes gas ranges.

Vulcan Crucible Steel Div., H. K. Porter Company Inc., changed its name to **Vulcan-Kidd Steel Div.** It is situated at Aliquippa, Pa.

Allied Chemical & Dye Corp. will change its name to **Allied Chemical Corp.**

Bendix-Skinner Div., Bendix Aviation Corp., was renamed **Bendix Filter Div.** effective Apr. 1. The Madison Heights, Mich., firm was acquired by Bendix in August, 1957.

National Cylinder Gas Co., Chicago, will change its name to **Chemetron Corp.** if approved by stockholders May 6. The firm originally produced only industrial

(*Please turn to Page* 88)

LOOKING FOR MORE FROM

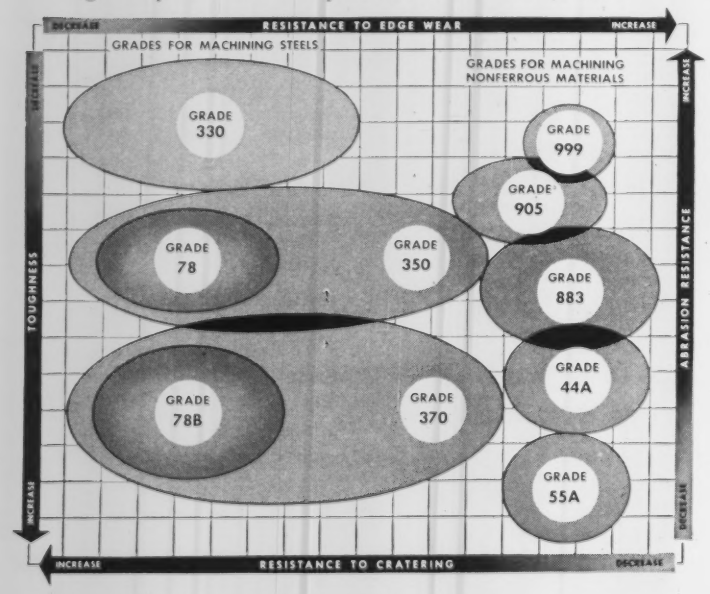
USE CARBOLOY® GRADE 78B General-Purpose carbide for top production—with low initial tool cost—on your steelcutting jobs

Long before anyone ever heard of "premium" carbides, Carboloy Grade 78B was doing a top-notch job as a high-quality, general-purpose steelcutting grade. It's *still* doing it—in thousands of plants where job requirements don't demand a carbide like Extra-Performance Grade 370.

On general-purpose steelcutting jobs, Grade 78B's lower initial cost pays off . . . and pays off handsomely. What's more, even on *tough* jobs, where runs are short, Grade 78B may prove itself the most economical carbide to use.

If you're not now using Grade 78B for general-purpose machining—or its companion, Grade 78 for finishing and light roughing—chances are you *should!* Order these two low-cost carbides from your Authorized Carboloy Distributor . . . today.

This complete team of Carboloy cemented carbides gives you more for your carbide tool dollar!



YOUR CARBIDE TOOL DOLLAR?

USE CARBOLOY® GRADE 370 Extra-Performance carbide on tough steelcutting jobs, for lower cost-per-piece, and long production runs

Carboloy Extra-Performance Grade 370 is the carbide to use where tool-cost-per-piece on heavy-duty jobs is eating up company profits. And it pays off, too, where production schedules demand longer-lasting tools to keep high-production machines in continuous profitable operation.

Grade 370 is the carbide everybody tries to match when it comes to roughing and interrupted cuts. But nobody does. Grade 370 stays sharp longer—at higher speeds and feeds—than any other heavy-duty carbide on the market.

Today, thousands of metalworking men are realizing significant production economies on heavy-duty jobs because Extra-Performance Grade 370 more than lives up to its name. Together with the other Carboloy Extra-Performance carbides—Finishing Grade 330 and Medium-Duty Grade 350—it can help you put a halt to declining profits. Just order from your local Authorized Carboloy Distributor. Then count the extra production you'll get . . . at lower cost-per-piece!

To get all the facts on Carboloy Extra-Performance Grades 330, 350, and 370—and General-Purpose Grades 78 and 78B—write: Metallurgical Products Department of General Electric Company, 11141 E. 8 Mile Street, Detroit 32, Michigan.

CARBOLOY®
CEMENTED CARBIDES

GENERAL ELECTRIC

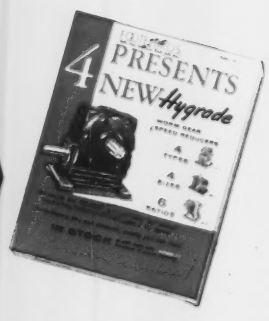
NEW 2" TO 3 3/8" CENTER HYGRADE WORM GEAR SPEED REDUCERS

1/3 TO 5 HORSEPOWER INPUT

Plus Features for Plus Service
• Strong, tough cast iron housings insure exact and permanent gear alignment, rigid bearing support.
• Wide-faced worm gear, made of virgin alloy bronze, on a forged steel gear shaft.
• Alloy steel worm and shaft . . . carburized, hardened and ground.
• Extra capacity ball radial and thrust bearings on worm shaft; tapered roller bearings on worm gear shaft.
• Improved neoprene spring backed lip seals on shafts.

Now—Foote Bros. offers the longer service life, greater capacity-for-size, more compact design and extra quality of famous Hygrade Reducers in 96 new combinations.

Advanced worm gear design and Foote Bros. precision production techniques make these new Hygrade Reducers the most efficient and economical power packages you can buy. And they're easier to select and buy, because Foote Bros. Distributors and Branch Warehouses carry them in stock ready for immediate delivery.



IN STOCK at Your Nearby Foote Bros. Distributor or Factory Warehouse

FOOTE BROS. Out-Rated LIFETIME GEARING

Write for new Hygrade Bulletin

FOOTE BROS. GEAR AND MACHINE CORPORATION
4583 South Western Blvd.
Chicago 9, Ill.

FOOTE BROS.
Better Power Transmission Through Better Gears

(*Concluded from Page 85*)

gases and equipment using gases, but has diversified widely in recent years. NCG and its subsidiaries have 81 plants in the U. S. and 14 plants in other countries.

Forms Cutting Tool Unit

Brown & Sharpe Mfg. Co., Providence, R. I., established an independent Cutting Tool Div., having acquired a cutting tool department from Nelco Tool Co., Manchester, Conn.

Agreements Signed

Hughes Aircraft Co. and Monogram Precision Industries Inc. signed agreements permitting Monogram to manufacture a new group of microwave devices developed by Hughes's research and development laboratories.

Young Sells Hangar Unit

M & B Metal Products Co., Birmingham, purchased the manufacturing facilities of Young Spring & Wire Corp.'s Star Service Hangar Div. Young's hangar operations had been conducted in plants at Leeds, Ala., and Chicago.

Strengthens Truck Framing

Parish Pressed Steel Div., Dana Corp., Reading, Pa., and U. S. Steel Corp., Pittsburgh, have joined forces to prefabricate truck body frames from high strength steels. U. S. Steel will supply special steels for Parish's new "package framing."

Forms Aluminum Wire Firm

Phillips Electric Co. and Canadian British Aluminum Co. have organized Phillips CBA Conductors Ltd. to produce aluminum rods, wire and cable, including steel reinforced aluminum cable. A $2-million plant will be built at Brockville, Ont., adjacent to the Phillips Electrical plant.

GE To Build Reactor

The Atomic Energy Commission issued a permit to General Electric Co. to construct a testing reactor. It will be built at GE's Vallecitos

AVAILABLE NOW

Welded Stainless Pipe
from large local stocks

Call your nearby Carpenter distributor. He has stocks of Schedules 5, 10 and 40 stainless pipe; sizes ⅛ to 4 inches. Call him today for fast delivery or information. The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Carpenter

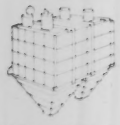
Stainless Pipe

Buell Combination Cyclone-Precipitator installation at cement plant.

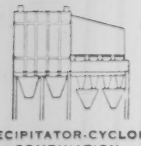
"Paid for itself!"

In nearly all cases, Buell dust or fume collection systems pay for themselves in just a few years. Buell "SF" Electric Precipitators provide extra collection efficiency *and* lower maintenance costs year after year, thanks to features like the exclusive high-emission, self-tensioning Spiral-ectrodes and unique Continuous Cycle Rapping. For specific information about dust collection efficiency and all three Buell systems, write for a copy of the booklet, "The Collection and Recovery of Industrial Dusts."
Dept. 26-D, Buell Engineering Company, Inc., 123 William Street, New York 38, N. Y.

BUELL CYCLONE



"SF" ELECTRIC PRECIPITATOR



PRECIPITATOR-CYCLONE COMBINATION

buell®

Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

Atomic Laboratory in Alameda County, California.

NEW PLANTS

International Parts Ltd., Toronto, Ont., began a 30,000 sq ft extension to its plant. It will be occupied in part by an associate company.

Brantford Coach & Body, Toronto, Ont., began an 80,000 sq ft trailer assembly plant to be completed early in 1959.

Syncro Corp. will begin operations by July 1 in a new electronics plant in Hicksville, Ohio.

B&T Machinery Co., Holland, Mich., opened a research laboratory for investigation and testing of new developments in the diecasting industry.

Aircraft Armanents Inc., Cockeysville, Md., has acquired a 15,000 sq ft building for housing its electronics assembly department. This brings the company's floor space to 100,000 sq ft.

Columbia Steel Equipment Co., a subsidiary of Standard Pressed Steel Co., Ft. Washington, Pa., has increased the size of its facilities to about 150,000 sq ft.

Harbison-Walker Refractories Co. opened a new plant in Hammond, Ind., between Grand Calumet River and the Indiana Toll Road. Construction was begun in 1956 and partial operation began late last year.

Braeburn Alloy Steel Corp. opened a new warehouse in North Miami, Fla. It will carry tool steel stocks primarily for servicing the extrusion industry in Miami and the southeastern states.

Libby-Owens-Ford Glass Co. will spend $15 million for capital improvements in 1958. Most will go toward doubling its technical center in Toledo, Ohio.

Mirro Aluminum Co., Manitowoc, Wis., will build a new rolling mill plant between Manitowoc and Two Rivers, Wis. It will consist of a

Does specialized business publication advertising help salesmen?

No one is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front... the men the ads are supposed to help... the men who sell.

Here is the statement of a salesman who knows what advertising does for him when it appears in the industrial, trade or professional publications that serve the specialized markets to which he sells:

W. A. Beach
Black & Decker Mfg. Co.
sells to wholesalers and retailers

says Mr. Beach:

"We have to sell our product first to the wholesaler; then help him sell to the retailer. We do a lot of missionary work. We make calls with the wholesaler salesmen and we run dealer and clerk training clinics in which we try to help the dealers improve their merchandising.

"Our trade advertising in publications read by the wholesaler and dealer, works with us along those same lines. In other words, it's like having an additional sales representative in each territory constantly calling on the dealers and wholesalers. Every time they open their trade books he tells them about our products and the special promotions we run to help them sell more. He works nights too, and calls on them at home when they're doing their reference work and planning. I know they do take their magazines home at night and read them. So, in effect, this 'salesman' works at night for us, and I do believe he finds them in a more receptive mood at that time.

"The greatest evidence that our advertising is out there doing a job and really paying off is in connection with the two large-scale promotions we do each year.

"For instance, right now we're working on our current Christmas promotion called 'The Bell-Ringer'. That was announced in September. Between the announcement and the Christmas selling season we must sell the wholesaler and then set up a schedule with each wholesaler to go out with his men and call on the trade and actually sell the deal to the retailer. You can imagine how tight our schedule is. In this short span of time we have to call on practically every hardware dealer in the territory. It adds up to a terrific number of calls and in order to get around, we just can't afford to give each dealer all the time we'd like to. In addition, it's extremely difficult to explain all the details on something like this Christmas promotion in the short time allotted each dealer.

"We couldn't do it if the advertising wasn't in there doing part of the work for us. Believe me, it's wonderful to find that when you do call on a wholesaler or dealer you don't have to take the time to explain all the details, because he has already read about it in the hardware publications. In most cases he's ready to see the merchandise. We have the opportunity to close the sale in short order. Right now I'm engaged in making dealer calls with wholesalers' salesmen and I'd say that nine cases out of ten the dealers have already seen our ads on the Christmas promotion and are somewhat pre-sold on the deal. In fact, in most cases I've found that all I have to do is show him the merchandise."

Ask your own salesmen

what your company's business publication advertising does for them. If their answers are generally favorable, you can be sure that it is really helping them sell. If too many answers are negative, it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.

How salesmen use their companies' advertising to get more business

Here's a useful package of ideas for the sales manager, advertising manager or agency man who would like to get more horsepower out of his advertising. Send for a free copy of the pocket size booklet which reports the successful methods employed by eleven salesmen who tell how they get more value out of their companies' business publication advertising.

HOW SALESMEN USE BUSINESS PUBLICATION ADVERTISING IN THEIR SELLING

You can be sure that more of your salesmen will use your advertising after they read how others get business through these simple methods.

The coupon is for your convenience in sending for your free copy.

NATIONAL BUSINESS PUBLICATIONS, INC.

NBP

...each of which serves a specialized market in a specific industry, trade or profession.

NATIONAL BUSINESS PUBLICATIONS, INC.
Department 11E
1413 K Street, N. W.
Washington 5, D. C. STerling 3-7533

Please send me a free copy of the NBP booklet "How Salesmen Use Business Publication Advertising in Their Selling."

Name _____

Title _____

Company _____

Street Address _____

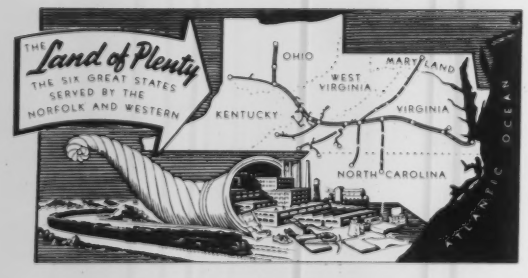
City _____ Zone _____ State _____

No matter how "smart" they make the machines, it still takes men to run them

When the holes in a die must be accurate to 2 10,000 of an inch, there's no substitute for men who know how to use precision machines. Men like Denver Haney, above, a machinist for The Mechanical Development Co., Inc. in Salem, Va., makers of dies and tools for all types of manufacturing, including atomic reactor parts.

Denver Haney is representative of the pool of highly skilled workers in *The Land of Plenty*, men with sound technical backgrounds and valuable on-the-job experience. More and more, the job opportunities and desirable living conditions in this great and growing industrial region are attracting highly skilled men.

If you're planning a new plant and need workers with technical know-how, the place to begin looking for your plant site is in the progressive six-state area served by the Norfolk and Western. There are many superior manufacturing advantages here. Let the N&W's plant location specialists tell you about them — *in confidence and without obligation.*



Write, wire or call—

L. E. Ward, Jr., Manager
Industrial and Agricultural Dept.
Drawer S-793 (Phone Diamond 4-1451, Ext. 474)
Norfolk and Western Railway
Roanoke, Virginia

Norfolk and Western RAILWAY

2-high reversing hot mill, a 4-high nonreversing cold mill and a Loewy-Hydromil for high speed production of aluminum foil.

NEW OFFICES

Henry Pratt Co., Chicago, manufacturer of valves and fabricated products for the power industry, opened a western district sales office at 3445 W. Eighth St., Los Angeles, Calif. R. L. Armstrong is in charge.

Square D Co. is erecting a 10,000 sq ft regional headquarters building at Pittsburgh. It is scheduled for completion early this summer.

J. O. Ross Engineering Div., Midland-Ross Corp., New York, plans to erect a Chicago area office building in suburban Mt. Prospect, Ill. Ross Engineering fabricates and installs air process systems used in industrial heating, drying, and curing operations. The new building will also include facilities for Chicago personnel of John Waldron Corp., a unit of Ross Engineering which makes web converting machinery and flexible couplings.

ASSOCIATIONS

Hoist Manufacturers Association Inc. met in New York and re-elected these officers: President, Arland R. Walkley, general manager, Manning, Maxwell & Moore Inc., Muskegon, Mich.; vice president, Milton L. Aitken, general sales manager, Robbins & Myers Inc., Springfield, Ohio; executive secretary and treasurer, Joe H. Peritz.

National Association of Waste Material Dealers Inc., New York, elected these officers: President, George H. Einhauser, G. H. Einhauser Co., Pittsburgh; vice presidents, Leo E. Selig, J. Solotken & Co. Inc., Indianapolis, Arthur U. Claghorn, Pioneer Paper Stock Co., Chicago, and Theodore Gruen, International Minerals & Metals Corp., New York.

Pin is inserted and collar placed on tail, gun then engages pull grooves, draws material together and pulls pin into hole. Collar is swaged into locking grooves and pin tail then is broken off at breaknock groove. Action takes place in the time it takes to pull trigger.

This quick demonstration at your desk will show how to get superior, more economical fastening with TOWNSEND LOCKBOLTS*

In a few minutes we can show how Townsend lockbolts will give you superior fastening at lower installed cost and improve your products. A Townsend engineer will demonstrate the ease with which they can be installed, and prove their high resistance to vibration and shock.

Townsend lockbolts provide a higher clinch, or clamping action than rivets, and more uniform fastening than nuts and bolts. They fill the hole better than other fasteners, have high tensile pre-load, make a more rigid joint and provide an effective liquid seal. Available in both steel and aluminum alloy in a variety of diameters and lengths—two head styles.

For a demonstration of how Townsend lockbolts will improve your fastening while lowering the cost, write to Townsend Company, P.O. Box 237-C, New Brighton, Pa

*Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049 and 2,754,703

The Fastening Authority

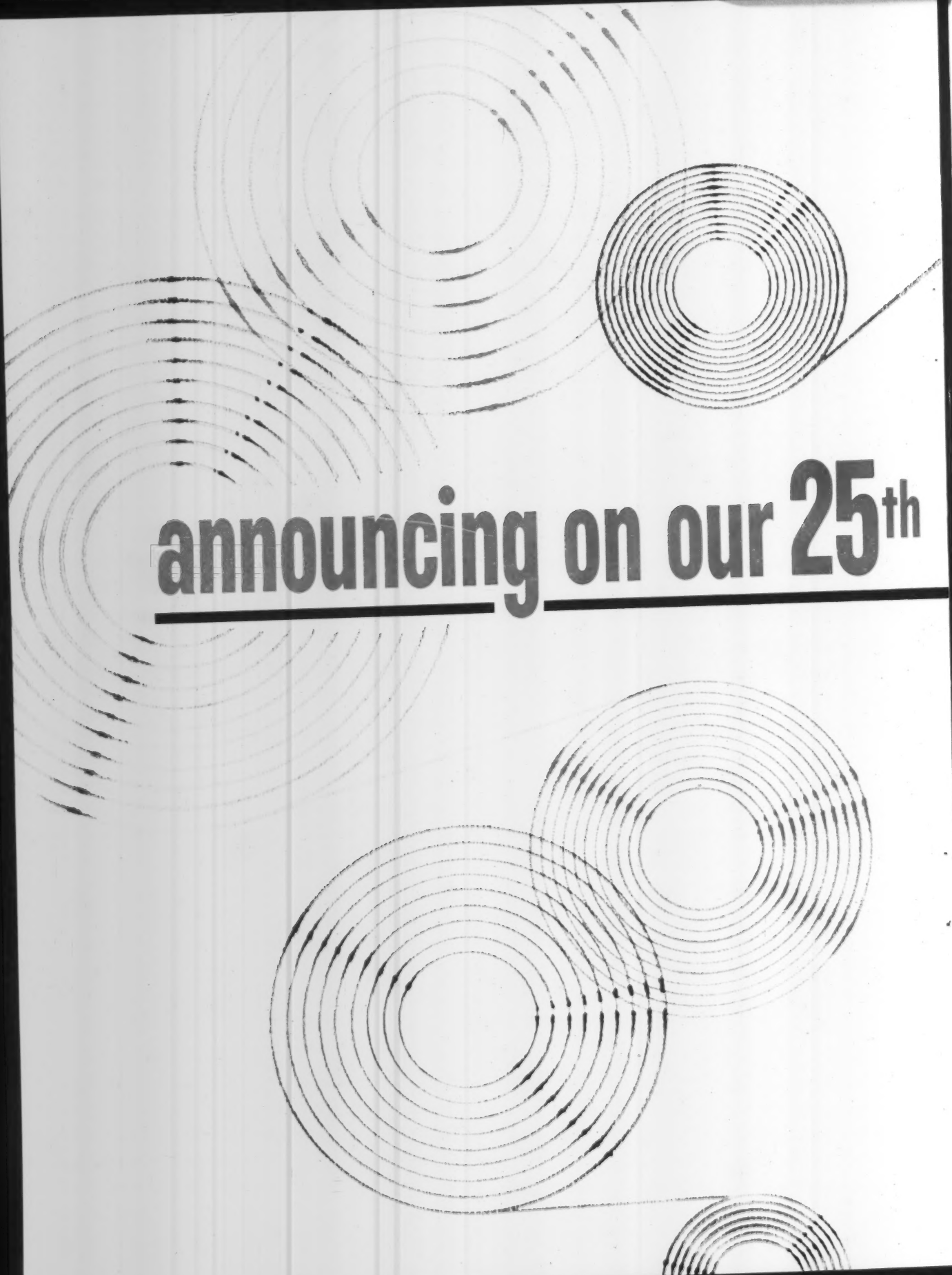
Townsend

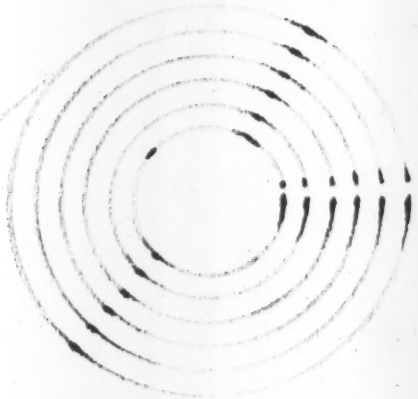
COMPANY • ESTABLISHED 1816

NEW BRIGHTON, PENNSYLVANIA

Sales Offices in Principal Cities

Cherry Rivet Division • Santa Ana, California


announcing on our 25th



anniversary

A REVOLUTIONARY NEW COIL ANNEALING SYSTEM

The Lee Wilson opened coil annealer

For the past quarter century the name Lee Wilson has been symbolic of annealing leadership. Now, on our 25th Anniversary, we are proud to announce the Lee Wilson Opened Coil System that is certain to become the standard of the industry.

The Lee Wilson Opened Coil System has all the advantages of continuous strand annealing with none of the disadvantages. It requires far less area and installation costs. It is easier to maintain. It anneals with a uniform thoroughness unmatched by any other method. It exposes 400 times more area to heating than conventional coil furnaces and delivers tonnages greater than modern day continuous furnaces. Its operating cost per ton is much less.

These are but a few of the outstanding features of this revolutionary new annealing system. We're sure you'll want to know more, so why not make a date to talk with a Lee Wilson engineer. When you get the facts, you'll be as excited about the Opened Coil System as we are.

Lee Wilson* ENGINEERING COMPANY, INC.

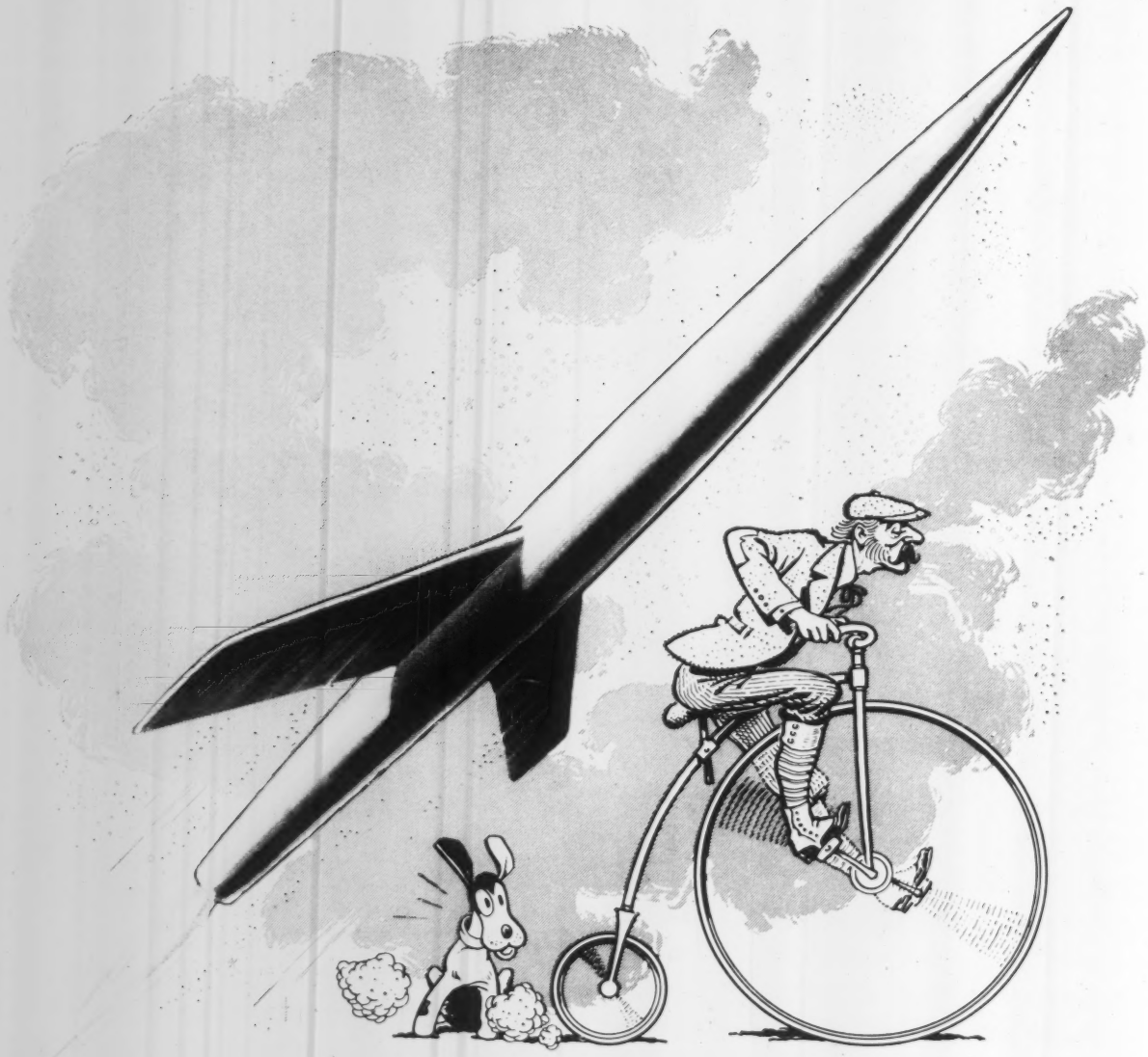
20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

SINGLE-STACK RADIANT TUBE ANNEALING FURNACES

MAKE THE BEST METALS BETTER

* ORIGINATORS AND LEADING PRODUCERS OF SINGLE-STACK RADIANT TUBE FURNACES

2228



Seventy-five Years ◇◇◇

TEN MILES an hour was "speed" in 1883 when Wyman-Gordon started to make forgings for the high-wheel bicycle. Through the 75 intervening years forgings have made important contributions to the phenomenal advances in propulsion. Progress from the first "horseless carriages"... from the early "flying machines"... to the supersonic speeds of today ...would not have been possible without forgings produced by the most advanced techniques of the day.

Wyman-Gordon is proud of its achievements in these fields and, as the largest producer of automotive and aircraft forgings, is prepared to accept the challenge of the future. Today, as for 75 years, there is no substitute for Wyman-Gordon quality and experience.

WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS
HARVEY, ILLINOIS • DETROIT, MICHIGAN

APRIL 21, 1958

A GUIDE TO

Tool Steels & Carbides

The diverse information you need as a buyer of tool steels, carbides, and ceramic materials is incorporated into this single source. It will help you pick a tool material for a job (over 1100 are listed). It will help you establish multiple sources (70 companies are listed). It will help you locate your nearest supplier for a given product. It will help you find the supplier or suppliers of the material you want to buy. Start with the crossindexes. They make it easy for you to find what you want.

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COMPILED BY THE EDITORS OF

STEEL
The Metalworking Weekly

PENTON BUILDING, CLEVELAND 13, OHIO

About The Guide

SEVENTY manufacturers of tool steels and carbides and the tooling materials they market are listed in this guide. Six manufacturers of ceramic cutting tools and their products are listed in a special table on page S-5. The index to manufacturers is on page S-6. If you're looking for a material for a job, the index tells which of the companies have products for the 11 different primary applications (see the table below).

The tradenames index, beginning at the bottom of this page, makes it easy to locate any of the listed materials.

Under each company listing, materials are given alphabetically, first by primary application, then by tradename. Where possible, the AISI-SAE designation is also given. The third column gives the chemical analysis, and the right-hand column tells quenching medium, machinability annealed, and the movement in hardening.

Breakdown of Primary Applications

COLD WORK DIES (Blanking)—Blanking—Lamination—Notching—Trimming

COLD WORK DIES (Cold Forming)—Nut and bolt—Heading—Crowning and crimping—Thread and form rolling—Bulldozer—Stamping—Notching—Burnishing—Drawing—Coining—Wire, rod and tube drawing—Extruded—Swaging—Knurling—Powder compression—Embossing-jewelry etc.—Bending

CUTTING TOOLS (Finishing)—Box turner—Forming—Shaving—Parting—Reaming—Boring—Counterboring—Broaching—Gear cutting—Threading—Milling—Planing—Filing—Scraping—Circular shearing—Hollow milling

DIE CASTING DIES—Molds—Trimming dies—Ejector pins

GAGES—Plugs—Rings—Snap—Thread plug—Thread rings—Best types of tool steels used for making gages are the manganese oil hardening, high carbon chrome, graphitic (oil hardening) and high speed

HIGH-STRESS AND HIGH-WEAR MACHINERY PARTS—Chuck jaws—Clutch pins—Collets and feed fingers—Clutch and chuck fingers—Quills—Stripper plates—Arbors—Drill bushings—Cams—Cam rolls—Centers—Mandrels—Spindles

HOT WORK DIES (Hot Forming)—Forging die inserts—Hot gripper and header dies—Hot compression dies—Hot extrusion dies—Hot bending dies—Hot swaging dies

HOT WORK DIES (Hot Punching and Shearing)—Railroad tie-plate hot punching and shearing—Railroad splice bar hot punching and shearing—Hot billet, bar and plate shears—Hot trimmers dies—Hot punches

PLASTIC MOLDING DIES (Ejector Pins)

PLASTIC MOLDING DIES (Hubbed Cavity Dies)

PLASTIC MOLDING DIES (Hubs)

PLASTIC MOLDING DIES (Machine Cut Gravity Dies)

PUNCHING AND SHEARING—Railroad tie-plate punches and dies—Railroad tie-plate shear blades—Structural shapes shear blades and punches—Perforating punches and dies

SHOCK RESISTING (Intermittent Impact)—Dowel pins—Drifts—Pilots—Screw driving—Tool shanks

SHOCK RESISTING (Repeated Impact)—Bearing—Riveting—Backing up—Burring—Caulking—Chisels—Hammers—Swaging

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CERAMIC CUTTING TOOLS

MANUFACTURER	TRADENAME	FORMS
Adamas Carbide Corp. Kenilworth, N. J.	CERALOX	Precision ground throwaways, triangular, square and round.
American Lava Corp. Chattanooga 5, Tenn.	AlSiMAG 674	Squares, triangles, round forms up to 1 sq in. in total area, up to ⅜ in. thick; throwaway cutting tools.
Diamonite Products Mfg. Co. 1232 Cleveland Ave. N. W., Canton 3, Ohio	DIAMONITE	Square, triangular and round throwaways, both utility and precision.
Raybestos Div., Raybestos-Manhattan Inc. Bridgeport 2, Conn.	RAYBESTOS ke-ram'ik®	Adhesive bonded to tool shank.
Stupakoff Div., Carborundum Co. Latrobe, Pa.	STUPALOX	Single point cutting tools, brazed tools (cemented), throwaway inserts. Standard blank, slug type, miscellaneous wear resistant applications.
Vascoloy Ramet Corp. 800 Market St., Waukegan, Ill.	VR-97	Precision ground, all throwaways.

Index of Materials by Companies

Products are available for the primary application indicated by an (x) in this table opposite company's name. For more specific information see company's complete listing on page indicated.

LISTING NUMBER and COMPANY	PAGE NO.	PRIMARY APPLICATIONS FOR WHICH PRODUCTS ARE LISTED										
		Cold Work Dies	Cutting Tools	Die-casting Dies	Gages	Hi-Stress Non-Wear Mach'y Parts	Hot Work Dies	Plastic Mold Dies	Punching and Shearing	Shock Resisting	CAST TYPE	CARBIDES
1—Ackerlind Steel Co. Inc.	S-7	X.	X.	X.	X.		X.	X.	X.	X.		
2—Adamas Carbide Corp.	S-7		X.	X.		X.				X.		X.
3—Allegheny Ludium Steel Corp.	S-8	X.	X.	X.	X.	X.	X.	X.		X.	X.	X.
4—Amalgamated Steel Corp.	S-10	X.		X.	X.	X.	X.		X.	X.		
65—Anchor Drawn Steel Co.	S-42	X.	X.	X.	X.	X.	X.	X.	X.	X.		
5—Armstrong Bros. Tool Co.	S-10		X.									X.
6—Associated Steel Co.	S-10	X.								X.		
7—Atlantic Steel Corp.	S-10	X.	X.						X.	X.	X.	X.
8—Atlas Steels Ltd.	S-11	X.	X.	X.			X.	X.	X.	X.		
9—Bedford Tool & Forge Co.	S-12									X.		
10—Bethlehem Steel Co.	S-12	X.	X.	X.			X.	X.	X.	X.		
11—Bissett Steel Co.	S-13	X.	X.	X.			X.		X.	X.		
12—Blackalloy Co. of America	S-14		X.									
13—H. Boker & Co. Inc.	S-14	X.	X.									
13A—Boyd-Wagner Co.	S-14	X.	X.		X.	X.	X.		X.	X.		
14—Braeburn Alloy Steel Corp.	S-15	X.	X.	X.			X.			X.		
15—Capewell Mfg. Co.	S-15	X.										
16—Carpenter Steel Co.	S-16	X.	X.	X.	X.	X.	X.	X.	X.	X.		
65—Colonial Steel Co.	S-42	X.	X.	X.	X.	X.	X.	X.	X.	X.		
17—Columbia Tool Steel Co.	S-17	X.	X.	X.			X.	X.	X.	X.		
18—Crucible Steel Co. of America	S-18	X.	X.	X.	X.	X.	X.	X.	X.	X.		
19—Darwin & Milner Inc.	S-19	X.	X.				X.	X.	X.	X.		
20—Delaware Tool Steel Corp.	S-20									X.		
21—Diehl Steel Co.	S-20	X.	X.				X.		X.			
22—Disston Div., H. K. Porter Co. Inc.	S-20	X.	X.	X.			X.	X.	X.	X.		
23—DoAll Co.	S-21	X.	X.							X.		X.
24—Faitoute Iron & Steel Co. Inc.	S-21	X.	X.							X.		
25—A. Finkl & Sons Co.	S-22						X.		X.			
26—Firth-Loach Metals Inc.	S-22	X.	X.				X.		X.	X.		X.
27—Firth Sterling Inc.	S-22	X.	X.	X.		X.	X.		X.	X.		X.
28—Great Western Steel Co. Inc.	S-24	X.	X.				X.	X.		X.		
29—Hawkridge Bros. Co.	S-24	X.						X.		X.		
30—Haynes Stellite Co.	S-25		X.	X.		X.			X.	X.		
31—Heppenstall Co.	S-25	X.		X.			X.	X.				
32—Hidalgo Steel Co. Inc.	S-26	X.							X.			
33—Houghton & Richards Inc.	S-26	X.	X.	X.		X.	X.	X.	X.	X.		X.
34—Hoyland Steel Co. Inc.	S-28	X.	X.	X.			X.	X.		X.		
35—Jamison Steel Corp.	S-29	X.					X.		X.	X.		
36—Jessop Steel Co.	S-29	X.	X.	X.			X.		X.	X.	X.	
37—Kennametal Inc.	S-30	X.	X.			X.	X.					X.
38—Kloster Steel Corp.	S-30	X.	X.				X.			X.		
39—Latrobe Steel Co.	S-31	X.	X.	X.	X.	X.	X.	X.	X.	X.		
40—Lehigh Steel Corp.	S-31	X.	X.			X.	X.		X.	X.		
41—P. F. McDonald & Co.	S-32	X.	X.	X.			X.	X.	X.	X.		
42—McInnes Steel Co.	S-33	X.										
43—Marshall Steel Co.	S-33	X.										
44—Meridian Steel Co.	S-33	X.	X.			X.	X.		X.	X.		
45—Metal Carbides Corp.	S-33	X.	X.						X.	X.		X.
46—Metallurgical Products Dept., General Electric Co.	S-33	X.	X.			X.				X.		X.
47—A. Milne & Co.	S-34	X.	X.	X.	X.	X.	X.	X.	X.	X.		
48—Newcomer Products Inc.	S-34		X.									X.
49—North American Steel Co.	S-35	X.		X.						X.		
50—Peninsular Steel Co.	S-35	X.		X.	X.		X.	X.	X.	X.		
51—Pennsylvania Steel Corp.	S-36	X.	X.			X.	X.		X.			
52—H. K. Porter Co. Inc., Vulcan-Kidd Steel Div.	S-36	X.	X.	X.	X.	X.	X.	X.	X.	X.		
53—Horace T. Potts Co.	S-37			X.		X.						
54—Pyramid Steel Co.	S-38	X.				X.	X.			X.		
55—Republic Steel Corp.	S-38	X.		X.			X.	X.	X.	X.		
56—Jos. T. Ryerson & Son Inc.	S-39	X.	X.	X.	X.	X.		X.	X.	X.		
57—Sandvik Steel Inc.	S-39	X.	X.									X.
58—Seaboard Steel Co. of America Inc.	S-39	X.	X.			X.			X.			
59—Simonds Saw & Steel Co.	S-39	X.	X.				X.			X.		
60—L. S. Starrett Co.	S-40	X.	X.						X.			
61—Timken Roller Bearing Co.	S-40	X.			X.	X.			X.			
62—Tungsten Alloy Mfg. Co. Inc.	S-40		X.			X.				X.		X.
63—Uddeholm Co. of America Inc.	S-40	X.		X.	X.		X.	X.	X.	X.		
64—Universal-Cyclops Steel Corp.	S-41	X.	X.	X.	X.		X.	X.	X.	X.		
65—Vanadium-Alloys Steel Co.	S-42	X.	X.	X.	X.	X.	X.	X.	X.	X.		
66—Vascoloy-Ramet Corp.	S-44	X.	X.			X.				X.		X.
67—Wesson Co.	S-44		X.			X.						X.
68—Willey's Carbide Tool Co.	S-44		X.			X.				X.		X.
69—Ziv Steel & Wire Co.	S-44	X.	X.		X.	X.	X.		X.	X.		

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

ACKERLIND STEEL CO. INC., 392 W. Broadway, New York 12, N. Y. — Listing No. 1

Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. #5 Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air Mach. 70 Movement + A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. #121 Air Hardening	A4	C 1.00, Mn 2.00, Cr .90, Mo .90	Air Mach. 65 Movement + A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. TRI-ACK Air Hardening	D2	C 1.50, Si .30, Mn .30, Cr 12.00, Mo .80, V .40	Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	BLUE LABEL Water Hardening	W1	C 1.00, Mn .30, Si .25	Water Mach. 100 Movement ±C
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	GREEN LABEL Oil Hardening	O1	C .90, Mn 1.15, Si .25, Cr .50, W .50, V .20	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	VI-CHROME Oil Hardening	D3	C 2.25, Cr 12.00, Mn .30, Si .30, V .60	Oil Mach. 40 Movement + B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	VIOLET LABEL Oil Hardening	O7	C .90, Mn .30, max. Si .25, Cr .50, W 1.50, V .20	Oil Mach. 80 Movement + B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	WHITE LABEL Water Hardening	W2	C 1.05, Mn .30, Si .25, V .20	Water Mach. 95 Movement ±C
Cutting Tools (Roughing, Finishing)	A.S. No. 66 High Speed	M2	C .85, Cr 4.00, W 6.50, Mo 5.00, V 1.90	Oil, Air Mach. 65 Movement ±A
Diecasting Dies	A.S. #670 Air Hardening	H13	C .38, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement + A
Diecasting Dies	A.S. CROMO WV Air Hardening	H12	C .35, Si 1.05, Cr 5.15, Mo 1.55, W 1.25, V .30	Air Mach. 70 Movement + A
Diecasting Dies	A.S. LUSTRE-DIE Prehardened		C .50, Mn 1.00, Si .30, Cr 1.10, Mo .25	Prehardened No movement
Gages	(See A.S. TRI-ACK, A.S. #5, GREEN LABEL, WHITE LABEL, Listed Above)			
Hot Work Dies (Hot Extrusion)	A.S. CROMO WV Upset Forged Discs		(See A.S. CROMO WV, Listed Above)	
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See A.S. #670, A.S. CROMO WV, Listed Above)			
Plastic Molding Dies	A.S. DURAMOLD B Oil Hardening	P2	C .07, Mn .30, Cr 1.00, Mo .25, Si .15, Boron Added	Oil Mach. 50 Movement + B
Plastic Molding Dies	A.S. SPECIAL HOBBING IRON Water Hardening	P1	C .05, Mn .10, Si .10	Water Mach. 40 Movement + C
Plastic Molding Dies (Hobs)	A.S. #7 Oil Hardening	S1	C .45, Si .75, Mn .25, Cr 1.15, W 2.55, V .20	Oil Mach. 75 Movement + B
Plastic Molding Dies (Hobs)	A.S. #85		C .55, Mn .40, Si .30, Cr 1.00, Mo .30, Ni 3.00	Oil Mach. 75 Movement + B
Plastic Molding Dies (Machined Cavity)	(See A.S. LUSTRE-DIE, GREEN LABEL, A.S. #5, A.S. DURAMOLD B, Listed Above)			
Punching and Shearing	(See A.S. #5, A.S. TRI-ACK, BLUE LABEL, WHITE LABEL, A.S. #7, GREEN LABEL, Listed Above)			
Shock Resisting Tools (Repeated Impact)	A.S. BEARCAT		C .50, Mn .70, Cr 3.25, Mo 1.40	Air Mach. 90 Movement + A
Shock Resisting Tools (Repeated, Intermittent Impact)	(See A.S. #7, A.S. #85, Listed Above)			

ADAMAS CARBIDE CORP., Kenilworth, N. J. — Listing No. 2

Cutting Tools (Very Fine Precision Boring & Finishing, Cast Iron, Nonferrous)	AAA, Carbide
Cutting Tools (Fine Precision Boring & Finishing, Cast Iron, Nonferrous)	AA, Carbide
Cutting Tools (General Purpose, Cast Iron, Nonferrous)	A, Carbide
Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous)	B, Carbide
Cutting Tools (Heavy or Interrupted Cuts, Cast Iron, Nonferrous)	BB, Carbide
Cutting Tools (Precision Boring & Turning, Steel)	CC, Carbide
Cutting Tools (Finishing & Semi-Finishing, Steel)	C, Carbide
Cutting Tools (General Purpose, Steel)	D, Carbide
Cutting Tools (Heavy or Interrupted Cuts, Steel)	DD, Carbide
Cutting Tools (Finishing & Light Roughing, with or without Interrupted Cuts, Steel)	548, Carbide
Cutting Tools (Heavy Roughing & Interrupted Cuts, Severe Conditions, Steel)	434, Carbide
Cutting Tools (Shaping, Planing, Shock Applications, Steel)	474, Carbide
Cutting Tools (Extremely Heavy Roughing or High Shock Interrupted Cuts, Suitable Hot Working & Removal of Hot Welding Flash)	GG, Carbide
Cutting Tools (Woodworking—Small Tips, Simple Form Tools)	A, Carbide
Cutting Tools (Woodworking—Large Tips, Intricate Forms)	B, Carbide
Dies (Fine Wire Drawing, Nonferrous, Coated Ferrous)	AAA, Carbide
Dies (Small Diameter Steel Drawing, Nonferrous Drawing Over 0.020 in., Compacting)	A, Carbide
Dies (Fine Wire Drawing, Light Cupping, Light Deep Drawing, Light Blanking, Compacting, Small & Medium wire Straightening)	B, Carbide
Dies (Cold Drawing Steel Rods-Bars-Tubing, Deep Drawing & Cupping, Blanking, Light Heading & Cold Extrusion, Quills & Cut-Off Knives, Medium & Large Wire Straightening, Tube Drawing Mandrels)	BB, Carbide
Dies (Lamination, Heading & Cold Extrusion, Small Nail Gripper, Large Tube Drawing Mandrels, Punches, Medium Shock Applications)	HD-15, Carbide
Dies (Heading, Smaller Swaging, Large Nail Gripper, Heavy Bolt Sizing & Cold Heading Hammers, Punches with Unsupported Sections, High Shock Applications)	HD-20, Carbide
Dies (Same Applications as HD-20 Carbide, Used Only If Galling & Seizing is Problem)	HD-20-T, Carbide
Dies (Large Size Cold Heading & Swaging, Large Nail Gripper, Maximum Shock Applications)	HD-25, Carbide
Dies (Same Applications as HD-25 Carbide, Use Only If Galling & Seizing is Problem)	HD-25-T, Carbide
Mining & Rock Drilling (All Materials, Superior Shock Resistance, Excellent Wear Resistance)	502, Carbide
Mining & Rock Drilling (All Applications Where Wear Resistance Is More Important Than Shock Resistance)	569, Carbide
Wear Resistance Parts (Superior Wear Resistance, Use Where Absolutely No Shock Encountered)	AAA, Carbide
Wear Resistance Parts (Excellent Wear Resistance, Use Where No Shock Encountered)	AA, Carbide
Wear Resistance Parts (Use Where Not Much Shock Encountered)	A, Carbide
Wear Resistance Parts (Use Where Light to Medium Shock and Light Impact Encountered)	B, Carbide
Wear Resistance Parts (Use Where Heavy Shock Encountered)	BB, Carbide
Wear Resistance Parts (Use Where Heavy Shock and Medium Impact Encountered)	HD-15, Carbide

★ List column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
ALLEGHENY LUDLUM STEEL CORP., 2020 Oliver Bldg., Pittsburgh 22, Pa.				**Listing No. 3**
Bushings (Cold Work, Forming Dies and Gages)	FC-EZ Graphitic Oil Hardening	O6	C 1.40, Cr .25, Mn 1.00, Si 1.40, Mo .25	Oil Mach. 125 Movement + A
Bushings (Cold Work, Forming Dies and Gages)	OILGRAPH Graphitic Oil Hardening	O6	C 1.35, Mn 1.00, Cr .25, Mo .25, Si 1.35	Oil Mach. 125 Movement + A
Bushings (Pneumatic Chisels, Air Gun Bushings)	LUDLUM 602 Water, Oil Hardening	S5	C .50, Mn .70, Mo .40, V .10, Si 1.70	Water, Oil Mach. 85 Movement — C
Carbon Drills, Reamers	CROW Water Hardening		C 1.20, Mn .25, Cr .50, Si .25	Water Mach. 100 Movement — C
Cold Forming Dies	CARMET CA-12, Carbide			
Cold Header Dies	CARMET CA-11, Carbide			
Cold Header Dies	CARMET CA-225, Carbide			
Cold Header Dies	POMPTON Water Hardening	W1	C .90-1.00	Water Mach. 100 Movement — C
Cold Header Dies	PYTHON Water Hardening	W2	C .90, Mn .30, V .25, Si .25	Water Mach. 85 Movement — C
Cold Work (Dies, Rolls, Cams, etc.)	ALHEAD Water Hardening		C 1.00, W 1.50, Co 1.50	Water Mach. 80 Movement C
Cold Work (Dies, Rolls, Cams, etc.)	FC Air Hardening Cast-to-Shape Air Hardening	D2	C 1.50, Mn .40, Cr 12.00, Mo .90, V .50, Co .75, Si .40, N .25	Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FC Air Hardening Forging Air Hardening	D2	C 1.50, Mn .40, Cr 12.00, Mo .90, V .50, Co .75, Si .40, N .25	Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, etc.)	FC ROLOY Cast-to-Shape Air Hardening	D2	C 1.50, Mn .40, Cr 12.00, Mo 1.20, V .50, Co .75, Si .40	Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FC 66 Cast-to-Shape Air Hardening	D5	C 1.50, Mn .40, Cr 12.00, Mo .90 V .50, Co 3.25, Si .40, N .35	Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FC 66 Forgings Air Hardening	D5	C 1.50, Mn .40, Cr 12.00, Mo .90, V .50, Co 3.25, Si .40, N .35	Air Mach. 50 Nonshrink
Cold Work Dies	AIRLOY Air Hardening		C 1.00, Mn 3.00, Cr 1.00, Mo 1.00, Si .25	Air Mach. 60 Movement + A
Cold Work Dies (Blanking)	CARMET CA-10, Carbide			
Cold Work Dies (Blanking)	CARMET CA-11, Carbide			
Cold Work Dies (Blanking, Long Runs)	HURON Oil Hardening	D3	C 2.00, Mn .25, Cr 12.00, V .80, Si .25	Oil Mach. 45 Movement + A
Cold Work Dies (Brick Molds)	HURON V Air, Oil Hardening		C 2.50, Cr 12.00, Mo .80, V 4.00	Air, Oil Mach. 40 Movement A
Cold Work Dies (Blanking, Forming)	FC ROLOY #2 Cast-to-Shape Air Hardening	A2	C 1.00, Mn .35, Cr 5.00, Mo 1.15, V .50, Si .35	Air Mach. 65 Movement A
Cold Work Dies (Blanking, Forming)	UTICA Water, Oil Hardening		C 1.25, Mn .30, Cr .40, W 1.40, V .20, Si .35	Oil, Water Mach. 65 Movement + A
Cold Work Dies (Blanking, Forming, Long Runs)	ONTARIO Air Hardening	D5	C 1.50, Mn .35, Cr 12.00, Mo .80, V .25, Si .30	Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Forming, Short Runs)	DEWARD Oil Hardening	O2	C .90, Mn 1.50, Mo .30, Si .25	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Forming, Short Runs)	SAGAMORE Air Hardening	A2	C 1.00, Mn .50, Cr 5.00, Mo 1.00, V .25, Si .25	Air Mach. 65 Movement A
Cold Work Dies (Blanking, Forming, Short Runs)	SARATOGA Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, Si .35	Oil Mach. 85 Movement + A
Cold Work Dies (Blanking, Forming, Jigs and Fixtures)	TIOGA Oil Hardening	L6	C .70, Mn .60, Si .25, Cr .65, Ni 1.50, Mo .15	Oil Mach. 75 Movement + B
Cold Work Dies (Inserts, Machine Parts)	FC Cast Tool Steel	W1	C .90, Mn .35, Si .30	Should not be Hardened Mach. 90
Cold Work Dies (and Machine Parts)	FC FLAMHARD Cast-to-Shape		C .50, Mn 1.15, Cr 1.20, Mo .40, V .12, Si .50	Oil Mach. 85 Movement B
Cold Work Dies (Brick Molds, Blanking, Forming)	SAGAMORE V		C 2.40, Cr 5.00, Mo 1.00, V 4.25	Air Mach. 50 Movement A
Cold Work Dies (Forming)	OTTAWA 60		C 3.25, Cr 1.00, Mo 1.00, V 12.00	Oil or Air Mach. 35 Movement A
Cutting Tools (Finishing)	ALX Cast Alloy		C 2.00, Cr 33.00, W 17.00, Co 42.00, Mo .70, B .90	No Heat Treat Grind Only
Cutting Tools (Finishing—Cast Iron, Nonferrous, Nonmetallics)	CARMET CA-4, Carbide			
Cutting Tools (Finishing—Nonferrous, Non-metallics)	CARMET CA-7, Carbide			
Cutting Tools (Finishing—Nonferrous, Non-metallics)	CARMET CA-8, Carbide			
Cutting Tools (Finishing Steel)	CARMET CA-606, Carbide			
Cutting Tools (Finishing Steel)	CARMET CA-608, Carbide			
Cutting Tools (Heavy Rough Cuts—Cast Iron)	CARMET CA-51, Carbide			
Cutting Tools (Precision Finishing Steel)	CARMET CA-605, Carbide			
Cutting Tools (Roughing)	PANTHER SPECIAL High Speed	T4	C .75, Mn .25, Cr 4.00, W 19.00, V 1.00, Co 5.00, Si .25	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	PANTHER 5	T15	C 1.50, Cr 4.75, W 12.50, V 5.00, Co 5.00	Oil, Air, Salt Mach. 40 Movement A
Cutting Tools (Roughing)	SUPER DBL High Speed	M36	C .80, Mn .40, Cr 4.00, W 5.50, Mo 4.25, V 1.75, Co 7.75, Si .40	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	SUPER PANTHER High Speed	T5	C .80, Mn .25, Cr 4.00, W 19.00, Mo .75, V 2.00, Co 7.00, Si .25	Oil, Air Mach. 45 Movement + A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Roughing—Cast Iron, Nonferrous, Nonmetallics)	CARMET CA-3, Carbide			
Cutting Tools (Heavy Interrupted Roughing)	CARMET CA-610, Carbide			
Cutting Tools (Roughing Steel)	CARMET CA-609, Carbide			
Cutting Tools (Roughing, Finishing)	DBL-2 High Speed	M2	C .80, Mn .25, Cr 4.00, W 6.00, Mo 5.00, V 1.75, Si .30	Oil, Air Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	DBL-3	M3	C 1.15, Cr 4.00, W 6.00, Mo 5.50, V 3.00	Oil, Air, Salt Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	LMW High Speed	M1	C .80, Mn .25, Cr 4.00, W 1.50, Mo 8.00, V 1.00, Si .30	Oil Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	LXX High Speed	T1	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .25	Oil, Air Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	ML High Speed	T2	C .80, Mn .30, Cr 4.00, W 18.00, Mo .75, V 2.00, Si .30	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	VLM High Speed	M10	C .85, Mn .30, Cr 4.00, Mo 8.00, V 2.00, Si .30	Oil Mach. 55 Movement + A
Diecasting Dies	POTOMAC A	H11	C .40, Mn .30, Si .90, Cr 5.00, Mo 1.30, V .50	Oil, Air Mach. 70 Movement A
Diecasting Dies	POTOMAC M Oil, Air Hardening	H13	C .40, Mn .35, Si 1.00, Cr 5.00, Mo 1.00, V 1.00	Oil, Air Mach. 70 Movement —A
Draw Dies	CROW	(Listed Above)		
Draw Dies	ONTARIO	(Listed Above)		
Gages	CARMET CA-3, Carbide			
Gages	CARMET CA-4, Carbide			
Gages	CARMET CA-815, Chrome Carbide			
Gages	DEWARD	(Listed Above)		
Gages	ONTARIO	(Listed Above)		
General Purpose Carbon Tool Steel (Not subject to test)	CORINTH Water Hardening		Straight Carbon	Water Mach. 100 Movement —C
General Purpose Carbon Tool Steel	POMPTON	(Listed Above)		
High Stress, High Wear Machine Parts & Hot Forming (Short Run)	FC CMS Cast-to-Shape Oil Hardening		C .60, Mn .70, Cr 1.00, Mo .40, V .10, Si .40, Ni .45	Oil or Air Mach. 85 Movement B
High Wear Machinery Parts, Liners	FC Nitri-Cast-Iron		C 2.70, Cr 1.00, Mn .60, Si 2.65, Mo .23, Al .98	Not Hardened, Nitride Only
Hot Work Dies (Brass and Aluminum Extrusion)	CARMET CA-815	(Listed Above)		
Hot Work Dies (Hot Forming)	ATLAS A Oil, Air Hardening	H21	C .30, Mn .30, Cr 3.00, W 9.00, V .50, Si .25	Oil, Air Mach. 70 Movement + B
Hot Work Dies (Hot Forming)	ATLAS B Oil, Air Hardening	H22	C .40, Mn .30, Cr 3.00, W 11.50, V .50, Si .25	Oil, Air Mach. 70 Movement + B
Hot Work Dies (Hot Forming)	FC 5X1 Cast-to-Shape Oil, Air Hardening	H12	C .32, Mn .35, Cr 5.00, W 1.35, Mo 1.35, V .25, Si 1.05	Oil or Air Mach. 70 Movement B
Hot Work Dies (Hot Forming Gen'l Purpose Hot Work)	POTOMAC Oil, Air Hardening	H12	C .32, Mn .30, Cr 5.00, W 1.25, Mo 1.50, V .25, Si .90	Oil, Air Mach. 70 Movement A
Hot Work Dies (Hot Forming)	(See POTOMAC A, Listed Above)			
Hot Work Dies (Hot Forming Extrusion Liners)	FC 5X1 Castings	H12	C .33, Mn .35, Cr 5.00, W 1.37, Mo 1.35, V .25, Si 1.00	Oil, Air Mach. 60 Movement —A
Hot Work Dies (Hot Forming Extrusion Liners)	FC 14 Forgings Oil, Air Hardening	H21	C .35, Mn .25, Cr 4.00, W 9.75, V .25, Si .20	Oil or Air Mach. 70 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	FC #19 Forgings	H14	C .30-.40, Cr 4.00-5.50, Mn .25-.40, Si 1.25-1.75, W 3.75-4.25, V .20-.35	Oil Mach. 70
Hot Work Dies (Hot Forming Extrusion Liners)	5X1-V	H13	C .40, Mn .35, Mo 1.25, V 1.00, Cr 5.00, Si 1.00	Oil, Air Mach. 60 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	5X1-Special	H21	C .33, Cr 2.75, Mn .30, V .30, Si .30, In 9.75, Ni 1.75, Mo .25	Oil, Air Mach. 45 Movement A
Hot Work Dies (Hot Punching)	SEMINOLE Medium Oil Hardening	S1	C .42, Mn .30, Cr 1.30, W 2.00, V .25, Si .25	Oil Mach. 85 Movement + B
Hot Work Dies (Hot Punching, Shearing)	EB ALLOY Oil, Air Hardening		C .75, Mn .30, Cr 3.75, Mo .50, V .35, Si .25	Oil, Air Mach. 75 Movement + B
Hot Work Dies (Hot Punching, Shearing)	MOHAWK Oil, Air Hardening	H25	C .45, Mn .30, Cr 3.50, W 14.00, V .70, Si .30	Oil, Air Mach. 60 Movement + A
Hot Work Dies	B-47		C .40, Cr 4.25, W 4.25, Co 4.25, V 2.25, Mo .40	Oil, Air Mach. 65 Movement A
Plastic Mold Die Hubs	LUDLUM 609	S5	C .60, Mn .80, Cr .25, Mo .25, V .20, Si 2.00	Oil, Water Mach. 80 Movement —C
Plastic Mold Die Hubs	SEMINOLE HARD Oil Hardening		C .52, Mn .30, Cr 1.30, W 2.00, V .25, Si .90	Oil Mach. 85 Movement + B
Plastic Mold Die Hubs	ONTARIO, SAGAMORE	(Listed Above)		
Shock Resisting (General Purpose)	SEMINOLE HARD Oil Hardening	(Listed Above)		
Shock Resisting (Intermittent Impact)	ATLAS 93 Oil Hardening		C .55, Mn .55, Cr .70, Mo .40, Si .20	Oil Mach. 90 Movement + B
Shock Resisting (Intermittent Impact) (Punching and Shearing)	LUDLUM 609 Water, Oil Hardening	(Listed Above)		
Shock Resisting (Intermittent Impact)	PYTHON	(Listed Above)		
Shock Resisting (Repeated Impacts)	LUDLUM 602	(Listed Above)		

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
AMALGAMATED STEEL CORP., Broadway & Wire Ave., Cleveland 5, Ohio				**Listing No. 4**
Cold Work Dies (Blanking, Cold Forming)	MAL-DIE Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, V .25, Mo 1.10	Air
Diecasting Dies	KROPUNCH Air Hardening		Special Analysis	Air
Diecasting Dies	KROTUNG Air Hardening	H12	C .33, Cr 4.75, W 1.30, Mo 1.50, V .25, Si .90	Air
Dies, Tools	DYKROME Air Hardening	D2	C 1.50, Cr 11.50, Mo .75, V .25	Air
Dies, Tools	DYMAL Oil Hardening	O1	C .90, Mn 1.15, Cr .50, W .50	Oil
Gages	(See DYMAL Listed Above)			
General Use—Tool Room	T.R.S. Water, Oil Hardening		Special Analysis	Water, Oil
High Stress, High Wear Machinery Parts	NON-TEMPERING Water, Oil Hardening	S6A	C .35, Mn .75, Si .35, Cr .80, W .25, Mo .50	Water, Oil
High Stress, High Wear Machinery Parts	(See T.R.S. Listed Above)			
Hot Work Dies	(See KROTUNG Listed Above)			
Hot Work Dies (Hot Punching)	SUPER SHOCK Oil Hardening	S1	C .50, Si .75, Cr 1.15, V .20, W 2.50	Oil
Machinery Parts	(See T.R.S., NON-TEMPERING Listed Above)			
Plastic Molding Master Hobs	(See SUPER SHOCK Listed Above)			
Punches, Dies, Slitters	(See KROPUNCH Listed Above)			
Punching & Shearing	DURO-CHIP Water, Oil Hardening	S5	C .55, Mn .80, Si 2.00, V .20, Mo .45	Water, Oil
Shock Resisting Tools (Intermittent Impact)	(See NON-TEMPERING Listed Above)			
Shock Resisting Tools (Repeated, Intermittent Impact)	(See SUPER SHOCK, T.R.S., NON-TEMPERING Listed Above)			
Special Purpose (Shock Resisting)	(See NON-TEMPERING Listed Above)			
ARMSTRONG BROS. TOOL CO., 5200 W. Armstrong Ave., Chicago 30, Ill.				**Listing No. 5**
Cutting Tools (Finish & Light Roughing, Steel)	ARMIDE (78 Carbide)			
Cutting Tools (General Purpose Machining, Steel)	ARMIDE (78B Carbide)			
Cutting Tools (General Purpose, Cast Iron, Nonferrous)	ARMIDE (883 Carbide)			
Cutting Tools (Light Roughing and General Finishing, Steel)	ARMIDE (350 Carbide)			
Cutting Tools (Heavy Roughing of Steel)	ARMIDE (370 Carbide)			
Cutting Tools (General Purpose Roughing and Finishing of Steel, Cast Iron and Nonferrous Metals)	ARMALOY		Cast Cobalt, Chromium, Tungsten Alloy	
Cutting Tools (General Purpose)	ARMSTRONG		High Speed Steel M-2	
Cutting Tools (Roughing)	ARMSTRONG		High Speed Cobalt M-34	
ASSOCIATED STEEL CO., 4545 Hough Ave., Cleveland 3, Ohio				**Listing No. 6**
Brake Dies (Heat Treated)	KROMITE BRAKE DIE			
Cold Work Dies	MOLEX #7			Oil Movement B
Cold Work Dies	MOLEX #8			Air Movement A
Cold Work Dies	MOLEX GROUND STOCK			Air, Oil Movement A
Cutting Dies	MOLEX TUBING			Oil Movement A
Hand Tools	ALTO			Water
Heat Treated Shafting	MIRRALLOY			
High Stress Machine Parts (Heat Treated)	KROMITE #3			Oil Movement B
Pneumatic Tools	ALTOLOY			Oil
ATLANTIC STEEL CORP., 35-27 36th St., Astoria 6, N. Y.				**Listing No. 7**
Cold Work (Blanking)	ATLAN Oil Hardening		C .90, Mn 1.15, Cr .50, W .50	Oil
Cold Work (Blanking)	ATLANTIC DIE Oil Hardening		C .70, Mn .40, Cr 1.00, Si .20, Ni 1.65	Oil
Cold Work (Blanking)	ATLAN HCC Oil and Air Hardening		C 1.50, Cr 12.00, Mo .80, V 1.00	Air or Oil

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Cold Forming)	ATSCO Water Hardening		C .75/1.10	Water
Cold Work	ATLOY Z		C .40, Mn .85, Si .35, Cr 1.00, Ni 1.00, Mo .45	Oil
Cold Work Dies (Blanking, Cold Forming)	HARDNAIR Air Hardening		C 1.00, Mn .65, Cr 5.00, Mo 1.10, V .30	Air
Cutting Tools (Roughing)	ACT CARBIDE High Speed		C .75, Mn .25, Cr 5.00, W 18.50, Mo .75, V 1.30, Co 11.00, Si .25	Oil
Punching & Shearing	ATSIL Water, Oil Hardening		C .50, Mn .60, Mo .40, W .50, Si 1.35	
Punching & Shearing	TUNCRO Oil Hardening		C .50, Mn .25, Cr 1.40, W 2.00, V .25, Si .25	Oil
Punching & Shearing	(See ATLANTIC DIE, ATLAN HCC, Listed Above)			
Shock Resisting	ATLANTIC 33		C .33, Mn .40, Cr .75, Mo .75, Cu .75, Si .65	Water
Special Purpose (Dies, Shock Tools)	ATLANTIC N.T. Flame Hardening		C .40, Mn .40, Cr 1.00, Mo .75, Cu .85, Si .65	Water or Air

ATLAS STEELS LTD., E. Main St., Welland, Ont., Canada — Listing No. 8

Cold Work Dies (Blanking, Cold Forming)	ATLAS REFINED 10 Water Hardening	W1	C 1.00, Mn .25, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Cold Forming)	ATLAS X10 Water Hardening	W1	C 1.05, Mn .20, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Blanking)	BADGER Oil Hardening	O7	C 1.25, Mn .25, Cr .50, W 1.50, V .20, Si .25	Oil Mach. 85 Movement + A
Cold Work Dies (Blanking, Cold Forming)	CRO-MO-LOY Air Hardening	A2	C 1.00, Mn 1.00, Cr 5.00, Mo 1.00, V .25, Si .30	Air Mach. 85 Movement + A
Cold Work Dies (Blanking, Cold Forming)	FNS Air Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .80, V .85, Si .30	Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Cold Forming)	KEEWATIN Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, Si .30, V .25	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming)	NN Oil Hardening	D3	C 2.25, Mn .30, Cr 12.50, V .25, Si .25	Oil Mach. 40 Movement + A
Cold Work Dies (Cold Forming)	ATLAS SPEC. ALLOY 10 Water Hardening	W2	C 1.05, Mn .20, V .20, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATLAS XXX Water Hardening	F2	C 1.35, Mn .30, Cr .35, W 3.75, Si .30	Water Mach. 75 Movement —C
Cold Work Dies (Cold Forming)	ATLAS XX95 Water Hardening	W1	C .95, Mn .30, Si .30	Water Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATLAS X12 Water Hardening	W1	C 1.20, Mn .25, Si .20	Water Mach. 100 Movement —C
Cutting Tools (Finishing)	ATLAS "Q" Water Hardening	W5	C 1.20, Mn .25, Cr .50, Si .20	Water Mach. 95 Movement —C
Cutting Tools (Finishing)	DENINE Water Hardening		C 1.25, Mn .25, W 1.40, Si .25	Water Mach. 90 Movement —C
Cutting Tools (Finishing)	TROJAN High Speed	T2	C .80, Mn .25, Cr 4.00, W 18.50, Mo .50, V 2.00, Si .30	Oil, Air Mach. 45 Movement + A
Cutting Tools (Finishing)	(See ATLAS X12, BADGER, ATLAS XXX Listed Above)			
Cutting Tools (Roughing)	MOHICAN-S High Speed	M1	C .80, Mn .25, Cr 4.00, W 1.50, Mo 9.00, V 1.20, Si .30	Oil, Air Mach. 55 Movement + A
Cutting Tools (Roughing)	NIPIGON High Speed	T5	C .78, Mn .25, Cr 4.00, W 19.00, Mo .80, V 2.00, Co 8.00, Si .30	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	POWHATAN High Speed	T4	C .75, Mn .25, Cr 4.00, W 19.00, V 1.20, Co 5.00, Si .30	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	SABRE		C 1.25, Mn .30, Si .30, W 10.00, Cr 4.25, Mo 2.50, V 4.30, Co 5.50	Oil, Air Mach. 45 Movement A
Cutting Tools (Roughing)	SIXIX High Speed	M2	C .82, Mn .25, Cr 4.00, W 6.50, Mo 5.00, V 2.00, Si .30	Oil, Air Mach. 55 Movement + A
Cutting Tools (Roughing)	SPARTAN 7 High Speed	T1	C .72, Mn .25, Cr 4.00, W 18.00, V 1.20, Si .30	Oil, Air Mach. 50 Movement + A
Cutting Tools (Roughing and Finishing)	ATLAS M-3	M3	C 1.10, Mn .30 max, Cr 4.25, W 6.00, Mo 5.00, V 3.00, Si .30 max	Oil, Air Mach. 50 Movement A
Cutting Tools (Roughing and Finishing)	ATLAS M-4	M4	C 1.27, Mn .30 max, Cr 4.25, W 6.00, Mo 4.75, V 4.00, Si .30 max	Oil, Air Mach. 45 Movement A
Cutting Tools (Roughing and Finishing)	ATLAS M-34	M34	C .90, Mn .30, Cr 3.75, W 1.45, Mo 8.70, V 2.05, Co 8.25, Si .25	Oil, Air Mach. 45 Movement A
Diecasting Dies	ATLAS DIE Casting Steel Oil Hardening		C .40, Mn .75, Cr .60, Mo .15, Si .20, Ni 1.25	Oil Mach. 100 Movement B
Diecasting Dies	CRODI Air Hardening	H12	C .35, Mn .40, Cr 5.00, Mo 1.40, V .40, Si 1.00	Air Mach. 75 Movement A
Diecasting Dies	HODI Air Hardening	H21	C .28, Mn .30, Cr 3.25, W 9.50, V .40, Si .30	Oil, Air Mach. 70 Movement + A
Diecasting Dies	RED INDIAN Air Hardening	H14	C .35, Mn .30, Cr 5.00, W 4.50, Mo .80, V .30, Co .50, Si 1.00	Air Mach. 75 Movement A
Diecasting Dies	SENECA Oil, Air Hardening	H21	C .35, Mn .30, Cr 3.25, W 9.50, V .40, Si .30	Oil, Air Mach. 70 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	CROVAN	H13	C .35, Mn .45, Cr 5.00, Mo 1.40, V .90, Si 1.00	Air Mach. 75 Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	HW-7		C .45, Mn .75, Cr 5.00, W 3.75, Mo 1.00, V .50, Co .50, Si 1.00	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	MOHICAN-6	H41	C .62, Mn .25, Cr 3.75, W 1.70, Mo 8.70, V 1.00, Si .30	Oil, Air Mach. 60 Movement A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	SPARTAN 5 Oil, Air Hardening	H26	C .50, Mn .30, Cr 4.00, W 18.00, V 1.00, Si .30	Oil, Air Mach. 55 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	ULTIMO 6 Oil, Air Hardening		C .55, Mn .55, Cr 1.00, Mo .75, Si .50, Ni 1.60	Oil Mach. 75 Movement A
Hot Work Dies (Hot Forming, Hot Punching Hot Shearing)	(See CRODI, RED INDIAN, SENECA, Listed Above)			
Plastic Molding Dies (Ejector Pins)	FALCON 6 Oil Hardening	S1	C .55, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil Mach. 80 Movement + B
Plastic Molding Dies (Ejector Pins)	MONARK 2 Water Hardening	S5	C .60, Mn .75, Cr .30, Mo .20, Si 2.00	Oil Mach. 80 Movement — B
Plastic Molding Dies (Ejector Pins)	ATLAS X12 Water Hardening	(Listed Above)		
Plastic Molding Dies (Hubs)	(See CRO-MO-LOY, FALCON 6, FNS, KEEWATIN, MONARK 2, NN)			
Plastic Molding Dies (Hubbed Cavity Dies)	ATLAS HOBBING IRON Water Hardening		C .05, Mn .20, Si .15	Water Movement —B
Plastic Molding Dies (Hubbed Cavity Dies)	IMPACTO Water Hardening	4620	C .16, Mn .50, Mo .25, Si .20, Ni 1.75	Oil Movement —B
Plastic Molding Dies (Machine Cut Cavities)	SUPERIMPACTO Oil Hardening	4815	C .12, Mn .50, Cr 1.50, Si .20, Ni 3.75	Oil Mach. 100 Movement —B
Plastic Molding Dies (Machine Cut Cavities)	(See CRO-MO-LOY, KEEWATIN, Listed Above)			
Punching and Shearing	ATLAS REFINED 8 Water Hardening	W1	C .80, Mn .25, Si .20	Water Mach. 100 Movement —C
Punching and Shearing	FALCON 4 Oil Hardening	S1	C .45, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil Mach. 80 Movement + B
Punching and Shearing	(See ATLAS XXX, ATLAS X10, FALCON 6, FNS, MONARK 2, NN, ULTIMO 6)			
Shock Resisting (Intermittent Impact)	ATLAS ALPHA 8 Water Hardening		C .80, Mn .25, Si .20, Cr-W-Mo-V higher than normal residuals	Water Mach. 100 Movement —C
Shock Resisting (Intermittent Impact)	MAPLE LEAF Water Hardening	W1	C .80, Mn .30, Si .25, Cr-W-Mo-V higher than normal residuals	Water Mach. 100 Movement —C
Shock Resisting (Punches, Pneumatic Tools)	MONARK 1	S2	C .50, Mn .40, Mo .45, Si 1.10	Water, Oil Mach. 85 Movement B
Shock Resisting (Repeated Impact)	ATLAS SPECIAL ALLOY 8 Water Hardening	W2	C .80, Mn .20, V .20, Si .20	Water Mach. 100 Movement —C
Shock Resisting (Repeated Impact)	(See ATLAS REFINED 8, FALCON 4, FALCON 6, MONARK 2)			

BEDFORD TOOL & FORGE CO., 22 Interstate St., Bedford, Ohio — Listing No. 9

Shock Resisting	BEDCO ALLOY	S5	C .55, Mn 1.00, Si 2.00, Mo .40, V .35	Water, Oil, Air blast, Still air Mach. 50 Movement C
Shock Resisting	BTF ALLOY	S5	C .55, Mn 1.00, Si 2.00, Mo .35, Cr .30	Water, Oil, Air blast, Still air Mach. 50 Movement C

BETHLEHEM STEEL CO., 701 E. Third St., Bethlehem, Pa. — Listing No. 10

Blacksmithing Tools	SOLID DRILL Water, Oil Hardening	W1	C .75, Mn .20, Si .15	Water, Oil Movement +B
Cold Work Dies (Blanking, Cold Forming)	A-H5 Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air Mach. 70 Movement + A
Cold Work Dies (Blanking, Cold Forming)	BTR Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, V .20	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming)	BEST Water Hardening	W2	C .75-1.10, V .15-.25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	LEHIGH H Air Hardening	D2	C 1.55, Cr 11.50, Mo .80, V 1.00	Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Cold Forming)	LEHIGH L Air Hardening	D1	C .85, Cr 11.50, Mo .45, V .30, Ni 1.00	Oil, Air Mach. 50 Movement +A
Cold Work Dies (Blanking, Cold Forming)	LEHIGH S Oil Hardening	D3	C 2.05, Cr 11.50, V .60	Oil Mach. 45 Movement + B
Cold Work Dies (Blanking, Cold Forming)	SUPERIOR Water Hardening	W2	C .80-1.35, V .15-.25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	X Water Hardening	W1	C .75-1.10	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	XX Water Hardening	W1	C .90-1.30	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	XXX Water Hardening	W1	C .90-1.35	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	XCL Water Hardening	W1	C .80-1.20	Water Mach. 100 Movement + C
Cutting Tools (Finishing)	HM High Speed	M1	C .78, Cr 3.90, W 1.60, Mo 8.50, V 1.05	Oil, Air Mach. 65 Movement +A
Cutting Tools (Roughing)	COMOKUT High Speed	T4	C .74, Cr 4.50, W 18.25, Mo .75, V 1.25, Co 5.00	Oil, Air Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	M-10 High Speed	M10	C .87, Cr 4.00, Mo 8.35, V 2.05	Oil, Air Mach. 60 Movement +A
Cutting Tools (Roughing, Finishing)	SPECIAL HS High Speed	T1	C .73, Cr 4.00, W 18.00, V 1.10	Oil, Air Mach. 60 Movement +A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Roughing, Finishing)	66HS High Speed	M2	C .83, Cr 4.15, W 6.35, Mo 5.00, V 1.50	Oil, Air Mach. 75 Movement +A
Cutting Tools (Roughing, Finishing)	66S High Speed		C .83, S .15, W 6.35, Mo 5.00, Cr 4.15, V 1.50, S .15	Oil, Air Mach. 75 Movement +A
Cutting Tools (Rough Drilling)	HOLLOW DRILL Water, Oil Hardening		C .80, Mn .20, Si .15	Water, Oil Movement +B
Cutting Tools (Rough Drilling)	ULTRA-ALLOY—HOLLOW DRILL Oil, Air Hardening		C .95, Mn .30, Si .25, Cr 1.30, Mo .35	Oil, Air Movement +A
Cutting Tools (Stone Drilling)	BROACHING & CHANNELLER Water Hardening		C .80, Mn .35, Si .25	Water Movement +C
Diecasting Dies	CROMO-V Air Hardening	H11	C .38, Cr 5.25, Mo 1.25, V .45, Si 1.05	Air Mach. 75 Movement +A
Diecasting Dies	CROMO-HIGH V Air Hardening	H13	C .40, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement +A
Diecasting Dies	CROMO-W Air Hardening	H12	C .35, Cr 5.15, W 1.55, Mo 1.65, Si 1.05	Air Mach. 70 Movement +A
Diecasting Dies	CROMO-WV Air Hardening	H12	C .37, Si 1.00, Cr 5.00, Mo 1.45, W 1.25, V .35	Air Mach. 70 Movement +A
Diecasting Dies	MULTIMOLD Oil Hardening	P20	C .35, Mn .70, Cr .80, Mo .30, Si .45	Oil Mach. 80 Movement +B
Diecasting Dies	57 HW Air Hardening	H21	C .35, Cr 3.25, W 9.35, V .50	Air Mach. 65 Movement +A
Diecasting Dies	57 SPECIAL Air Hardening	H24	C .42, Cr 3.50, W 14.00, V .30	Air Mach. 60 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	HWS Air Hardening	H43	C .60, Cr 3.60, Mo 8.50, V 1.75	Air Mach. 65 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	SPECIAL HS-55	H26	C .55, Cr 4.00, W 18.00, V 1.10	Oil or Air Mach. 65 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See CROMO-V, CROMO-W, 57 HW, 57 SPECIAL, Listed Above)			
Plastic Molding Dies (Hubbed Cavity)	DURAMOLD A Air Hardening	P4	C .07, Mn .35, Cr 4.50, Mo .50, Si .20	Air Mach. 60 Movement +A
Plastic Molding Dies (Hubbed Cavity)	DURAMOLD B Oil Hardening	P2	C .06, Mn .30, Cr .95, Mo .25, Si .15, Boron Added	Oil Mach. 50 Movement +B
Plastic Molding Dies (Machined Cavity)	LUSTRE-DIE Heat Treated BHN 302/352		C .50, Mn 1.00, Si .30, Cr 1.10, Mo .25	
Plastic Molding Dies (Machined Cavity)	DURAMOLD N Oil Hardening	P6	C .10, Mn .50, Cr 1.50, Si .25, Ni 3.50	Oil Mach. 80 Movement +B
Plastic Molding Dies (Machined Cavity)	DURAMOLD NI-CR Oil Hardening	P3	C .10, Cr .60, Ni 1.25	Oil Mach. 80 Movement +B
Plastic Molding Dies (Machined Cavity)	(See BTR, A-H5, MULTIMOLD, Listed Above)			
Plastic Molding Dies (Hobs)	(See BTR, A-H5, LEHIGH H, Listed Above)			
Plastic Molding (Master Hobs)	67 CHISEL Oil Hardening	S1	C .50, Cr 1.25, W 2.50, V .20, Si .75	Oil Mach. 75 Movement +B
Press Brake Dies	BRAKE DIE Heat Treated BHN 248/293		C .50, Mn .90, Cr 1.00, Mo .20	Oil Mach. 100 Movement +B
Punching & Shearing	OMEGA Water, Oil Hardening	S5	C .60, Mn .70, Mo .45, V .20, Si 1.85	Oil, Water Mach. 65 Movement ±B
Punching & Shearing	71 ALLOY Water, Oil Hardening	S4	C .65, Mn .90, Si 2.00	Oil, Water Mach. 65 Movement ±B
Punching & Shearing	(See X, XX, XXX, XCL, BEST, BTR, A-H5, LEHIGH H, LEHIGH L, LEHIGH S, 67 CHISEL, SUPERIOR, Listed Above)			
Punching & Shearing	TOUGH M Oil Hardening	L2	C .45, Mn .55, Cr .95, V .20, Si .20	Oil Mach. 80 Movement +B
Shock Resisting Tools (Repeated Impact)	BEARCAT Air Hardening		C .50, Mn .70, Cr 3.25, Mo 1.40	Air Mach. 90 Movement +A
Shock Resisting Tools (Repeated Impact)	IMPERIAL Oil, Water Hardening	S2	C .50, Mn .70, Si .70, V .20, Mo .45	Oil, Water Mach. 75 Movement ±B
Shock Resisting Tools (Repeated, Intermittent Impact)	(See OMEGA, TOUGH M, 67 CHISEL, 71 ALLOY, Listed Above)			
Special Purpose (Cold Work Dies)	BETHALLOY Oil Hardening	L6	C .75, Mn .75, Cr .90, Mo .35, Ni 1.80	Oil Mach. 85 Movement +B
Special Purpose (Cutting Tools)	67 TAP Oil Hardening	O7	C 1.25, Cr .65, W 1.40, V .20	Oil Mach. 60 Movement +B
Special Purpose (Cutting Tools)	BFS Water Hardening	F2	C 1.30, Mn .28, W 3.50	Water Mach. 70 Movement +C
Special Purpose (Shock Resisting)	NON-TEMPERING Water, Oil Hardening		C .35, Mn .70, Cr .80, Mo .30, Si .45, Cu .30	Water, Oil Mach. 80 Movement ±B
Special Purpose (Shock Resisting)	PISTON Water Hardening		C 1.15, Cr .55, V .20	Water Mach. 80 Movement +C
Special Purpose (Shock Resisting and Cold Work Dies)	CROMO-W55 Air, Oil Hardening	H12	C .55, Mn .30, Si .90, Cr 5.10, Mo 1.45, W 1.25	Air Mach. 70 Movement +A

BISSETT STEEL CO., 945 E. 67th St., Cleveland 3, Ohio — Listing No. 11

Cold Work Dies (Blanking, Cold Forming)	BISCO TOOL STEEL TUBING Oil Hardening	C 1.00, Mn 1.00, Cr 1.50, Mo .20	Oil
Cold Work Dies	AIRPRO Air Hardening	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25, Si .20	Air
Cold Work Dies	OILTEMP Oil Hardening	C .90, Mn 1.10, Cr .50, W .50, V .20	Oil
Cutting Tools (Finishing)	CARBON Water Hardening	C As Desired, Mn .25, Si .20	Brine
Cutting Tools (Finishing)	CARVAN Water Hardening	C As Desired, Mn .25, V .25, Si .20	Brine
Cutting Tools (Finishing)	TIGER VAN High Speed	C .80, Cr 4.25, W 18.50, Mo .50, V 2.10	Oil

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools	BISMO M-2 High Speed		C .82, Cr 4.00, W 6.50, Mo 5.00, V 1.90	Oil
Cutting Tools	BISMO M-3 High Speed		C 1.00, Cr 4.00, W 6.25, Mo 6.25, V 2.40	Oil
Cutting Tools	BISMO S-4-1 High Speed		C As Desired, Cr 4.00, W 1.50, Mo 8.50, V 1.15	Oil
Cutting Tools	SUPER TIGER High Speed		C .80, Cr 4.50, W 18.50, Mo .80, V 1.75, Co 7.50	Oil
Cutting Tools	TIGER BRAND High Speed		C As Desired, Cr 4.00, W 18.00, V 1.10	Oil
Cutting Tools	TIGER SPECIAL High Speed		C .75, Cr 4.25, W 18.00, Mo .50, V 1.10, Co 5.00	Oil
Diecasting (Aluminum)	GRIPMORE NO. 1 Air Hardening		C .35, Mn .35, Cr 5.00, Mo 1.00, V .40, Si 1.00	Air
Diecasting (Aluminum)	GRIPMORE NO. 1-V Air Hardening		C .35, Mn .35, Cr 5.00, Mo 1.00, V 1.10, Si 1.00	Air
Hot Work Dies	CHECKNO NO. 1 Oil Hardening		C .45, Mn .25, Cr 3.50, W 13.25, Si .20	Oil
Hot Work Dies	CHECKNO NO. 2 O.I Hardening		C .35, Mn .25, Cr 3.50, W 11.00, V .45, Si .20	O.I
Hot Work Dies	CHECKNO NO. 3 Oil Hardening		C .28, Mn .30, Cr 3.25, W 8.50, V .30, Si .30	Oil
Hot Work Dies	CROMVA Water, O.I Hardening		C .35 or .50, Mn .60, Cr 1.00, V .20	Water, Oil
Hot Work Dies	HYPRO A Oil, Air Hardening		C .35, Mn .60, Cr 7.50, W 7.50, Si 1.50	Oil, Air
Hot Work Dies	HYPRO B Air Hardening		C .35, Mn .25, Cr 5.25, W 5.25, Mo .20, V .20, Co .50, Si .90	Air
Hot Work Dies	WOCO Oil, Air Hardening		C .45, Cr 1.50, W 2.25, V .25	O.I
Hot Work Dies	GRIPMORE NO. 2 Air Hardening		C .35, Mn .35, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	Air
Punching, Shearing	ANNITE NO. 1 Oil Hardening		C 2.25, Mn .30, Cr 13.00, V .20, Si .25	Oil
Punching, Shearing	ANNITE No. 2 Air Hardening		C 1.50, Mn .30, Cr 11.50, Mo .80, V .25, Si .25	Air
Shock Resisting	CROMO Oil Hardening		C .55, Mn .50, Cr 1.00, Mo .35	O.I
Shock Resisting	SILIMO Water, O.I Hardening		C .50, Mn .45, Mo .50, V .20, Si 1.10	Water, O.I
Shock Resisting	SILICARB Water, Oil Hardening		C .55, Mn .75, Mo .20, Si 2.00	Water, Oil
Shock Resisting	(See CROMVA, WOCO, Listed Above)			

BLACKALLOY CO. OF AMERICA, Central Terminal Bldg., 415 Lexington Ave., New York 17, N. Y. — Listing No. 12

Cutting Tools	BLACKALLOY, Type #525		Mach. 0	Co, W, Cr, Cb, Ta

H. BOKER & CO. INC., 101 Duane St., New York 7, N. Y. — Listing No. 13

Blanking and Forming Dies	KINITE (Air Hardening) In Rolled, Bars and Casting form		C 1.52, Mn .54, Cr 12.74, Mo .98, V .60, Co .57, Si .47	Air	(High Speed) Movement A
Cutting Tools	NOVO SUPERIOR High Speed		C .72, Mn .24, Cr 4.14, W 18.36, V 1.08, Si .27	Oil	(High Speed) Movement A
Cutting Tools	TWIN MO High Speed		C .84, Si .25, Mn .25, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil	Mach. (High Speed)
Dies	OILWAY O.I Hardening		C .94, Mn 1.23, Cr .44, W .57	O.I	See (*) Movement A

*Same as carbon water hardening steel

BOYD-WAGNER CO., 1440 W. Lake St., Chicago 7, Ill. — Listing No. 13A

Cold Work Dies (Blanking, Stamping, Forming)	ARROW Non-shrinkable	O1	C .95, Mn 1.20, Cr .50, W .50, V .10, P .018, S .010	Oil	Mach. 100 Movement A
Cold Work Dies (Blanking) (Long Run Stamping Dies, Forming Dies & Tools, Drawing Dies)	HYPRO 61 Hi C Hi Chrome	D2	C 1.50, Si .30, Mn .70, Cr 12, V .20, Mo .80	Air	Mach. 60
Cold Work Dies (Blanking) (Lamination Dies, Knurls, Thread Rolling Dies)	HYPRO 62 Hi C Hi Chrome	D3	C 2.00, Si .30, Mn .70, Cr 13.00, W 1.20, P .018, S .010 max	Oil	Mach. 60
Cold Work Dies (Embossing & Jewelers Dies)	VERY BEST Carbon	W2	C 1.0-1.1, Cr .10, V .10, P .018, S .010	Water	Mach. 100 Movement A
Cold Work Dies (Extrusion Dies)	RECORD 66 M-2 High Speed	M2	C .83, Cr 4.20, Mo 5.00, W 6.25, V 1.90, Si .30, Mn .25	Oil	Mach. 62
Cold Work Dies (Cold Forming) (Small Tools, Stamping Dies, Swaging, Heading)	BEST Carbon	W1	C 1.00, Si .20, Mn .30, P .018 max, S .010	Water	Mach. 100 Movement A
Cutting Tools (Finishing) (Pulverizing & Slitting Cutters, Forming, Bending, Trimming)	(See HYPRO 62, Listed Above)				
Cutting Tools (For Tools of High Cutting Ability, Abrasion Resistant, High Temperature Use)	RECORD SUPERIOR High Speed	T1	C .70, Cr 4.00, W 18.00, V 1.00	Oil	Mach. 62

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Woodcutting & Turning, Flat Drills, Reamers, Planers, Taps, End Mills)	(See RECORD 66, VERY BEST, Listed Above)			
Gages	(See HYPRO 62, Listed Above)			
Gages (Master Tools & Dies)	HI-DI 5 Non-Shrinking	A2	C 1.00, Mn .70, Cr 5.20, Mo 1.10, V .20, P .018, S .010	Air Mach. 65 Movement A
High-Stress, High-Wear Machinery Parts (Collets, Lathe Centers, Parts)	(See BEST, Listed Above)			
Hot Work Dies (Bolt & Gripper Dies, Header & Trimmer, Punches & Shear Blades)	CROMO-W	H12	C .33, Si 1.05, W 1.55, Mo 1.65, Cr 5.00	Air Mach. 70
Punching & Shearing	(See HYPRO 61, HYPRO 62, Listed Above)			
Shock Resistant (Repeated Impact) (Pneumatic Tools, Shear Blades, Heavy Duty Punches, Chisels)	SPECIAL 18	S1	C .45, Mn .30, Si 1.00, Cr 1.40, Mo .30, W 2.40, V .20	Water or Oil Mach. 67 Movement A
Wear Resistant & Shock Resistant (Shear Blades, Pneumatic Tools, Caulking, Beading Tools)	DUREDGE	S5	C .55, Mn .70, Si 1.90, Mo .45, V .20	Oil Mach. 65

BRAEBURN ALLOY STEEL CORP., Braeburn, Pa. — Listing No. 14

Cold Work Dies (Blanking, Cold Forming)	AIRQUE Air Hardening	A2	C 1.00, Mn .70, Cr 5.25, Mo 1.15, V .25, Si .30	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	EXTRA Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	KISKI Oil Hardening	O1	C .95, Mn 1.10, Cr .50, W .60, V .20, Si .30	Oil Movement A
Cold Work Dies (Blanking, Cold Forming)	S.O.D. Oil Hardening	O2	C .90, Mn 1.65	Oil Movement A
Cold Work Dies (Blanking, Cold Forming)	SPECIAL V Water Hardening	W2	C 1.00, Mn .25, V .20, Si .25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	SUPERIOR 1 Oil Hardening	D3	C 2.15, Mn .50, Cr 12.50, V .60, Si .30	Oil Movement A
Cold Work Dies (Blanking, Cold Forming)	SUPERIOR 3 Oil, Air Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .80, V .80, Si .30	Oil Movement A
Cutting Tools (Roughing)	BONDED CARBIDE High Speed	T6	C .70, Mn .25, Cr 4.50, W 18.50, Mo .70, V 1.50, Co 12.00, Si .25	Oil Movement B
Cutting Tools (Roughing)	BONDED CARBIDE Jr. High Speed	T5	C .77, Mn .25, Cr 4.25, W 18.50, Mo .75, V 1.95, Co 7.60, Si .25	Oil Movement B
Cutting Tools (Roughing)	COBALT High Speed	T4	C .74, Mn .25, Cr 4.00, W 18.00, Mo .50, V 1.00, Co 5.00, Si .25	Oil Movement B
Cutting Tools (Roughing)	COMO High Speed	M30	C .77, Mn .25, Cr 4.00, W 1.55, Mo 8.50, V 1.20, Co 5.00, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	BRAEMOW High Speed	M2	C .82, Mn .25, Cr 4.20, W 6.50, Mo 5.00, V 1.90, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	BRAEVAN M-3 High Speed	M3	C 1.00, Mn .25, Cr 4.00, W 6.20, Mo 5.60, V 2.50, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	CONGO High Speed	M6	C .78, Mn .25, Cr 4.00, W 4.00, Mo 5.00, V 1.40, Co 12.00, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	MOCUT High Speed	M1	C .80, Mn .25, Cr 4.00, W 1.55, Mo 8.00, V 1.10, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	TWINVAN High Speed	T2	C .82, Mn .25, Cr 4.25, W 18.50, Mo .65, V 2.10, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	VINCO High Speed	T1	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .25	Oil Movement B
Diecasting Dies (Aluminum)	PRESSURDIE 3 Air Hardening	H13	C .39, Mn .30, Cr 5.50, Mo 1.10, V 1.00, Si 1.00	Air Movement A
Hot Work Dies (Brass Extrusion Dummies)	ECONO Air Hardening		C .40, Cr 3.75, W 1.00, V .75, Mo 5.75	Air Movement A
Hot Work Dies (Plastic Dies & Forming)	PRESSURDIE 3-L Air Hardening	H11	C .39, Cr 5.50, V .50, Si 1.00, Mo 1.10	Air Movement A
Hot Work Dies (Punching, Forming)	PRESSURDIE "C" Air Hardening		C .38, Cr 4.20, W 4.20, Mo .50, V 2.20, Co 4.20	Air Movement A
Hot Work Dies (Punching, Forming)	PRESSURDIE 1 Air Hardening	H14	C .38, Mn .30, Cr 5.00, W 5.00, Mo .25, V .20, Co .50, Si .90	Air Movement A
Hot Work Dies (Punching, Forming)	T-ALLOY Oil, Air Hardening	H22	C .35, Mn .25, Cr 3.50, W 10.50, V .40, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "A" Oil, Air Hardening	H21	C .33, Mn .25, Cr 3.50, W 9.60, V .50, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "B" Oil, Air Hardening	H24	C .50, Mn .25, Cr 3.00, W 15.00, V .50, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "C" Oil, Air Hardening	H25	C .25, Mn .25, Cr 4.00, W 15.00, V .50, Si .25	Oil Movement B
Hot Work Dies (Aluminum Punching and Forming)	PRESSURDIE 2 Air Hardening	H12	C .35, Mn .35, Cr 5.00, W 1.20, Mo 1.45, V .35, Si 1.00	Air Movement A
Shock Resisting	TRITON Water Hardening	S2	C .50, Mn .35, Mo .60, Si 1.00	Water Movement B
Shock Resisting	VIBRO Oil Hardening	S1	C .50, Mn .25, Cr 1.40, W 1.90, V .25, Si .25	Oil Movement B

CAPEWELL MFG. CO., 60 Governor St., Hartford 2, Conn. — Listing No. 15

Cold Work Dies (Blanking, Cold Forming; also Punching & Shearing, Machinery Parts, Gages)	MICROLOY	O1	C .90, Mn 1.20, Cr .50, W .50, Si .30, V .20	Oil Mach. 100 Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "−" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

CARPENTER STEEL CO., 339 W. Bern St., Reading, Pa.

Listing No. 16

Cold Work Dies (Cold Forming)	H-9 DOUBLE HEADER Water Hardening	W1 (0.90C)	C .90, Mn .40, Si .40	Water Mach. 100 Movement ±C*
Cold Work Dies (Cold Forming)	SOLAR Water Hardening	S2	C .50, Mn .40, Mo .50, Si 1.00	Water Mach. 75 Movement ±C*
Cold Work Dies (Blanking, Cold Forming)	HAMPDEN Oil Hardening	D3	C 2.10, Mn .25, Cr 12.50, Si .25, Ni .50	Oil Mach. 50 Movement +A
Cold Work Dies (Blanking, Cold Forming)	K-W Water Hardening	F3	C 1.30, Mn .30, W 3.50, Si .30	Water Mach. 80 Movement —C
Cold Work Dies (Blanking, Cold Forming)	O-1	O1	C .90, Mn 1.30, Cr .50, W .50	Oil Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	R.D.S. Oil Hardening	L6	C .70, Mn .35, Cr 1.00, Si .25, Ni 1.75	Oil Mach. 75 Movement +A
Cold Work Dies (Blanking, Cold Forming)	STENTOR Oil Hardening	O2	C .90, Mn 1.60, Si .25	Oil Mach. 100 Movement +A
Cold Work Dies (Blanking, Cold Forming)	VEGA Air Hardening	A6	C .70, Mn 2.00, Cr 1.00, Mo 1.35, Si .30	Air Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	No. 11 SPECIAL Water Hardening	W1 (1.00C)	C 1.05, Mn .20, Si .20	Water Mach. 100 Movement ±C*
Cold Work Dies (Blanking, Cold Forming)	No. 484 Air Hardening	A2	C 1.00, Mn .70, Cr 5.00, Mo 1.00, V .20, Si .20	Air Mach. 70 Movement +A
Cold Work Dies (Blanking, Cold Forming)	No. 610 Air Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .80, V .90, Si .30	Air Mach. 50 Movement +A
Cutting Tools (Roughing, Finishing)	GOLD STAR High Speed Bits	T8	C .77, Cr 3.75, W 13.75, Co 5.00, V 2.00	
Cutting Tools (Finishing)	K-W	(Listed Above)		
Cutting Tools (Roughing, Finishing)	SPEED STAR High Speed, Hot Work Tool Steel	M2	C .82, Mn .25, Cr 4.25, W 6.25, Mo 5.00, V 1.90, Si .25	Oil Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	STAR BORON High Speed Bits	M40	C .55, Cr 4.25, W 1.75, V 1.75, Mo 8.50, Co 8.00, B .50	
Cutting Tools (Roughing, Finishing)	STAR-ZENITH High Speed, Hot Work Tool Steel	T1	C .72, Mn .25, Cr 4.00, W 18.25, V 1.15, Si .20	Oil Mach. 45 Movement +A
Diecasting Dies (Hubbed Cavity Dies)	SUPER SAMSON	P4	C .10, Mn .30, Cr 5.00, Mo .90, V .25, Si .20	Oil, Air Mach. 70 Movement ±A
Diecasting Dies	No. 883 Hot Work Tool Steel	H13	C .40, Mn .35, Cr 5.00, Mo 1.35, V .90, Si 1.10	Oil, Air Mach. 65 Movement ±B*
Diecasting Dies (Ejector Pins)	No. 883	(Listed Above)		
Gages	T.G.S. Oil Hardening		C .20, Mn 1.30, Si .20	Oil Mach. 100 Movement +A
Gages	(See HAMPDEN, No. 11 SPECIAL, No. 484, No. 610, STENTOR, O-1, Listed Above)			
High Stress, High Wear Machinery Parts	(See T.G.S., R.D.S., Listed Above)			
High Stress, High Wear Machinery Parts	No. 481 Collet Steel	S5	C .60, Mn .80, Si 1.90, Mo .30, Cr .30	Oil Mach. 70 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	STAR-ZENITH Low Carbon	H26	C .40, Cr 4.00, W 18.00, V 1.00	Oil Mach. 45 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	T-K Hot Work Tool Steel	H21	C .35, Mn .30, Cr 3.50, W 9.00, V .40, Si .30	Oil, Air Mach. 55 Movement ±B*
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	No. 345 Hot Work Tool Steel	H12	C .35, Mn .45, Cr 5.00, W 1.25, Mo 1.50, V .25, Si 1.00	Oil, Air Mach. 65 Movement ±B*
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	No. 883	(Listed Above)		
Hot Work Dies (Hot Punching, Hot Shearing)	(See SPEED STAR, STAR-ZENITH, Listed Above)			
Plastic Molding Dies (Ejector Pins)	(See No. 11 SPECIAL, SOLAR, STENTOR, O-1, Listed Above)			
Plastic Molding Dies (Hubs)	VEGA	(Listed Above)		
Plastic Molding Dies (Hubbed Cavity Dies)	MIRROMOLD Water Hardening	P1	C .10, Mn .20, V .10	Water Movement ±B*
Plastic Molding Dies (Machine Cut Cavity Dies)	No. 158 Oil Hardening	P6	C .10, Mn .50, Cr 1.50, Ni 3.50, Si .20	Oil, Air Movement +B, +A
Plastic Molding Dies (Machine Cut Cavity Dies)	STENTOR	(Listed Above)		
Plastic Molding Dies (Machine Cut and Hubbed Cavity Dies)	SAMSON EXTRA Water, Oil Hardening	P5	C .10, Mn .40, Cr 2.30, Si .30	Water, Oil Movement ±B, ±A
Plastic Molding Dies (Machine Cut and Hubbed Cavity Dies)	SUPER SAMSON	(Listed Above)		
Plastic Molding Dies (Hubbed Cavity Dies, Machine Cut Cavity Dies)	STAINLESS M.S. No. 2		C .30, Cr 13.00	Oil, Air Movement ±B, ±A*
Plastic Molding Dies (Machine Cut Cavity Dies, Hubs)	R.D.S. Oil Hardening	(Listed Above)		
Plastic Molding Dies (Machine Cut Cavity Dies, Hubs, Ejector Pins)	VEGA	(Listed Above)		
Punching and Shearing	(See HAMPDEN, H-9 DOUBLE HEADER, No. 11 SPECIAL, No. 484, No. 610, R.D.S., SOLAR, O-1, STENTOR, VEGA, Listed Above)			
Shock Resisting (Repeated, Intermittent Impact)	(See R.D.S., SOLAR, VEGA, Listed Above)			

*Plus or minus—depending on size and shape of section.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

COLUMBIA TOOL STEEL CO., Lincoln Highway & State St., Chicago Heights, Ill. — Listing No. 17

Cold Work Dies (Blanking, Cold Forming, Coining)	ATMODIE Air Hardening High Carbon, High Chrome	D2	C 1.50, Mn .30, Cr 12.00, Mo .85, V .85, Si .40	Air Movement A
Cold Work Dies (Blanking, Long Runs)	ATMODIE SMOOTHCUT Air Hardening High Carbon, High Chrome	D2S	C 1.50, Mn .30, Cr 12.00, Mo .85, V .85	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	CLARITE High Speed	T1	C .73, Mn .30, Cr 4.00, W 18.00, V 1.10, Si .30	Oil Movement + C
Cold Work Dies (Blanking, Cold Forming)	EXLDIE Oil Hardening, Non-Deforming	O1	C .90, Mn 1.15, Cr .50, W .50, V .10, Si .25	Oil Movement B + A
Cold Work Dies (Blanking, Cold Forming, Short Runs)	EXTRA Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Movement —C
Cold Work Dies	EXTRA HEADERDIE Water Hardening	W1	C .95, Mn .35, Si .25	Water Movement —C
Cold Work Dies (Blanking, Cold Forming)	EZ-DIE SMOOTHCUT Air Hardening, Non-Deforming	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.15, V .25, Si .30	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	MOLITE High Speed	M2	C .83, Mn .25, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Si .30	Oil Movement + B
Cold Work Dies (Blanking, Cold Forming)	OILDIE Oil Hardening, Non-Deforming	O1	C 1.05, Mn .70, Cr 1.60, W .50, Si .40	Oil Movement + A
Cold Work Dies (Blanking, Cold Forming)	SPECIAL Water Hardening	W1	C 1.00, Mn .25, Cr .16, V .05, Si .25	Water Movement —C
Cold Work Dies (Blanking, Cold Forming)	STANDARD Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Movement —C
Cold Work Dies (Blanking, Cold Forming, Long Runs)	SUPERDIE High Carbon, High Chrome	D3	C 2.10, Mn .30, Cr 11.50, W .80, Si .90	Oil Movement + A
Cold Work Dies (Blanking, Cold Forming, not severe)	VANADIUM STANDARD Water Hardening	W2	C .90, Mn .25, V .20, Si .25	Water Movement —C
Cold Work Dies (Blanking, Cold Forming)	WATERDIE EXTRA Water Hardening	W5	C 1.00, Mn .35, Cr .50, Si .25	Water Movement —C
Cutting Tools	ACMITE High Tungsten Cobalt High Speed Oil Hardening	T4	C .73, Cr 4.00, W 18.00, V 1.15, Co 5.00	Oil or Salts Movement + B
Cutting Tools (Finishing)	CARVITE	T9	C 1.25, Cr 4.00, W 18.50, V 4.00	Air, Oil or Salts Movement + B
Cutting Tools (Roughing)	COBITE	T5	C .78, Cr 4.25, W 18.50, V 1.88, Co 9.00	Air, Oil or Salts Movement + B
Cutting Tools	MOLITE 3 Moly High Speed Oil Hardening	M3	C 1.03, Cr 4.00, W 6.15, Mo 5.90, V 2.50	Oil or Salts Movement + B
Cutting Tools (Finishing)	VANITE High Speed	T2	C .83, Mn .25, Cr 4.25, W 18.50, Mo 1.00 Max, V 2.15, Si .30	Oil Movement + B
Cutting Tools (Roughing)	MAXITE Cobalt High Speed	T8	C .73, Mn .25, Cr 4.00, W 14.00, Mo 1.00 Max, V 2.15, Si .30, Co 4.75	Oil Movement + C
Cutting Tools (Finishing, Roughing)	(See CLARITE, MOLITE, Listed Above)			
Diecasting Dies	ALCODIE Air Hardening, Heat & Shock Resistant	H12	C .35, Cr 5.00, W 1.25, Mo 1.40, V .40	Air Movement + A
Diecasting Dies	CASTDIE Air Hardening, Heat Resistant	H11	C .38, Mn .35, Cr 5.25, Mo 1.35, V .50, Si 1.00	Air Movement + A
Diecasting Dies	VANADIUM CASTDIE Air Hardening and Shock Resisting	H13	C .38, Cr 5.25, Mo 1.35, V 1.05	Air Movement + A
Hot Work Dies (Hot Forming, Punch & Shear)	BUSTER Oil Hardening, Shock Resistant	S1	C .58, Mn .30, Cr 1.25, W 2.25, V .25, Si .75	Oil Movement + B
Hot Work Dies	CLARITE HW Oil Hardening	T1	C .57, Cr 4.00, W 18.00, V .70	Oil or Salts Movement + B
Hot Work Dies (Hot Forming, Punch & Shear)	FIREDIE Air Hardening, Heat Resistant	H11	C .38, Mn .35, Cr 5.25, Mo 1.35, V .50, Si 1.00	Air Movement + A
Hot Work Dies (Hot Forming, Punch & Shear)	FORMITE #2 High Speed, Heat Resistant	H21	C .30, Mn .30, Cr 3.25, W 9.25, Mo .60 Max, V .50, Si .40	Oil Movement + B
Hot Work Dies	FORMITE #3 Oil Hardening	H24	C .50, Cr 3.25, W 15.50, V .50	Oil or Salts Movement + B
Hot Work Dies (Hot Forming, Punch & Shear)	MOLITE—HW 10 High Speed, Heat Resistant	H43	C .64, Mn .30, Cr 4.00, Mo 8.25, V 2.00, Si .30	Oil, Air Movement + B
Plastic Mold Dies	PLASDIE Oil Hardening	P20	C .30, Cr .80, Mo .25	Oil Movement + A
Plastic Mold Dies	(See BUSTER, EXLDIE, OILDIE, Listed Above)			
Punching & Shearing	CEC SMOOTHCUT Oil & Water Hardening	S5	C .55, Mn .80, Si 2.00, Cr .25, V .25	Water, Oil Movement + C
Punching & Shearing	(See ATMODIE, SUPERDIE, OILDIE, EXLDIE, CLARITE, MOLITE, SPECIAL, BUSTER, EXTRA, Listed Above)			
Shock Resisting (Repeated Intermittent Impact)	VANADIUM EXTRA Water Hardening		C .95, Mn .25, V .20, Si .25	Water Movement —C
Shock Resisting (Repeated Intermittent Impact)	(See BUSTER, SPECIAL, EXTRA, CEC SMOOTHCUT, EXTRA HEADERDIE, Listed Above)			

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

CRUCIBLE STEEL CO. OF AMERICA, 405 Lexington Ave., New York 17, N. Y. — Listing No. 18

Cold Work Dies (Blanking)	AIRDI 150 Air Hardening	D2	C 1.55, Mn .35, Si .45, Cr 11.50, V .90, Mo .80	Air Movement + A
Cold Work Dies (Blanking)	AIRDI 150-S Air Hardening		C 1.55, Cr 11.50, Mo .80, V .90, Mn .35, Si .45, S .15	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	AIRKOOL Air Hardening	A2	C 1.00, Mn .70, Si .30, Cr 5.25, V .30, Mo 1.15	Air Movement + A
Cold Work Dies (Blanking, Cold Forming)	AIRKOOL S Air Hardening		C 1.00, Mn .70, Cr 5.25, Mo 1.15, V .30, Si .30, S .15	Air Movement + A
Cold Work Dies (Blanking)	HYCC Air Hardening	D4	C 2.25, Mn .35, Si .50, Cr 11.50, V .20, Mo .80	Air, Oil Movement + A
Cold Work Dies (Blanking)	KETOS Oil Hardening	O1	C .90, Mn 1.35, Si .35, Cr .50, W .50	Oil Movement + A
Cold Work Dies (Cold Forming)	ALVA EXTRA Water Hardening	W2	C .95, Mn .25, Si .20, V .20	Water, Brine Movement — C
Cold Work Dies (Cold Forming)	ATHA PNEU Oil Hardening	S1	C .55, Mn .25, Si .25, Cr 1.25, V .20, W 2.75	Oil Movement + B
Cold Work Dies (Cold Forming)	CRESCENT SPECIAL Water Hardening	W1	C 1.05, Mn .35, Si .20	Water, Brine Movement — C
Cold Work Dies (Cold Forming)	GRANADA Water Hardening	W1	C 1.00, Mn .30, Si .25	Water Movement — C
Cold Work Dies (Cold Forming)	GRANADA VANADIUM Water Hardening	W2	C 1.00, Mn .30, Si .25, V .20	Water Movement — C
Cold Work Dies (Cold Forming)	LaBELLE EXTRA Water Hardening	W1	C .95, Mn .25, Si .20	Water, Brine Movement — C
Cold Work Dies (Cold Forming)	LaBELLE SILICON #2 Water Hardening	S5	C .60, Mn .85, Si 1.85, Cr .25, Mo .30	Water Movement — B
Cold Work Dies (Cold Forming)	LaBELLE COLD STRIKING DIE Water Hardening	W1	C .95, Mn .35, Si .45	Water, Brine Movement — C
Cold Work Dies (Cold Forming)	SANDERSON EXTRA Water Hardening		C 1.05, Mn .25, Si .20	Water, Brine Movement — C
Cold Work Dies (Cold Forming)	SANDERSON SPECIAL Water Hardening	W1	C 1.10, Mn .30, Si .50, Cr .25	Water Movement — C
Cold Work Dies, Wear Parts (Blanking, Cold Forming)	AIRKOOL V Air Hardening		C 2.25, Mn .35, Si .80, Cr 5.25, V 3.75, Mo 3.00	Air Movement + A
Cold Work Dies, Wear Parts (Blanking, Cold Forming)	HALCOMB 8S Oil Hardening	L7	C 1.05, Mn .35, Si .25, Cr 1.20, Mo .30	Oil Movement + B
Cutting Tools	REXALLOY —Cast Alloy		C 2.25, Cr 33.00, W 17.00, Co 44.00	
Cutting Tools (Finishing)	CRUCIBLE DOUBLE SPECIAL Water Hardening	F3	C 1.30, W 3.50, Mn .30, Si .30	Water or Brine Movement — C
Cutting Tools (Finishing)	REX M-3 High Speed	M2	C 1.10, Mn .30, Si .30, Cr 4.00, V 3.00, W 6.00, Mo 5.00	Air, Oil or Salt Movement + A
Cutting Tools (Finishing)	REX SUPERVAN High Speed	T2	C .85, Mn .30, Si .30, Cr 4.00, V 2.10, W 18.50, Mo .75	Air, Oil or Salt Movement + A
Cutting Tools (Finishing)	REX 4V High Speed	T9	C 1.25, Mn .30, Si .30, Cr 4.00, V 4.00, W 18.50, Mo .75	Air, Oil or Salt Movement + A
Cutting Tools (General Purpose)	REX AA High Speed	T1	C .75, Mn .30, Si .30, Cr 4.00, V 1.15, W 18.00	Air, Oil or Salt Movement + A
Cutting Tools (General Purpose)	REX M-2 High Speed	M2	C .85, Mn .30, Si .30, Cr 4.15, V 1.95, W 6.40, Mo 5.00	Air, Oil or Salt Movement + A
Cutting Tools (General Purpose)	REX M-2-S High Speed		C .85, Mn .30, S .15, Si .30, Cr 4.15, V 1.96, W 6.40, Mo 5.00	Air, Oil or Salt Movement + A
Cutting Tools (General Purpose)	REX TMO High Speed	M1	C .85, Mn .30, Si .30, Cr 3.75, V 1.15, W 1.55, Mo 8.70	Air, Oil or Salt Movement + A
Cutting Tools (General Purpose)	REX VM High Speed	M10	C .90, Mn .30, Si .30, Cr 4.00, V 1.95, Mo 8.00	Air, Oil or Salt Movement + A
Cutting Tools (General Purpose)	REX 3V High Speed		C 1.00, Mn .30, Si .30, Cr 4.00, V 3.00, W 14.00, Mo .75	Air, Oil or Salt Movement + A
Cutting Tools (Roughing)	REX AAA High Speed	T4	C .75, Mn .30, Si .30, Cr 4.00, V 1.15, W 18.00, Mo .75, Co 5.00	Air, Oil or Salt Movement + A
Cutting Tools (Roughing)	REX SUPERCUT High Speed	T5	C .80, Mn .30, Si .30, Cr 4.00, V 2.00, W 18.50, Mo .65, Co 8.00	Air, Oil or Salt Movement + A
Cutting Tools (Roughing)	REX M2-5 High Speed	M35	C .85, Cr 4.15, W 6.40, Mo 5.00, V 1.95, Co 5.00, Mn .30, Si .30	Air, Oil or Salt Movement + A
Cutting Tools (Roughing)	REX 95 High Speed	T8	C .80, Mn .30, Si .30, Cr 4.00, V 2.00, W 14.00, Mo .75, Co 5.25	Air, Oil or Salt Movement + A
Cutting Tools (Roughing)	REX 440 High Speed	T6	C .80, Mn .30, Si .30, Cr 4.00, V 2.00, W 19.50, Mo .60, Co 12.00	Air, Oil or Salt Movement + A
Diecasting (Aluminum Base)	NuDIE V Hot Work	H13	C .40, Mn .40, Si 1.10, Cr 5.00, V 1.10, Mo 1.35	Air Movement + A
Diecasting (Brass)	PEERLESS A Hot Work	H21	C .30, Mn .30, Si .30, Cr 3.35, V .25, W 9.00	Air, Oil Movement + A
Diecasting (Lead, Manganese, Tin or Zinc Base)	CSM #2 Oil Hardening	P20	C .30, Mn .80, Si .50, Cr .80, Mo .25	Oil Movement + B
Diecasting Dies (Parts)	REX AA High Speed, Hot Work	T1	C .75, Mn .30, Si .30, Cr 4.00, V 1.15, W 18.00	Air, Oil or Salt Movement + A
Diecasting Dies (Parts)	NuDIE V Hot Work	H13	C .40, Mn .40, Si 1.10, Cr 5.00, V 1.10, Mo 1.35	Air Movement + A
Diecasting Dies (Parts)	REX M-2 High Speed, Hot Work	M2	C .85, Mn .30, Si .30, Cr 4.15, V 1.95, W 6.40, Mo 5.00	Air, Oil or Salt Movement + A
Gages (Flat, Snap, Plug, & Thread)	(See KETOS, AIRKOOL, HYCC, REX AA, REX M-2 and REXALLOY, Listed Above)			
Gages (Rings, Plugs)	HALGRAPH Graphitic Oil Hardening	O6	C 1.50, Mn .75, Si 1.00, Mo .25	Oil Movement + B
Gages (Snap)	CRESCENT SPECIAL Water Hardening	W1	C 1.05, Mn .35, Si .20	
High Stress Non-Wear (Machinery Parts)	CRUCIBLE SELF-TEM Oil Hardening		C .35, Mn .70, Si .25, Cr .85, W .50, Mo .40	Oil Movement + B
Hot Work Dies (Forming, Punching, & Shearing)	(See ATHA PNEU, Listed Above)			
Hot Work Dies (Forming, Punching, & Shearing)	HALCOMB 218 Hot Work	H11	C .40, Mn .40, Si 1.05, Cr 5.00, V .35, Mo 1.35	Air Movement + A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work Dies (Forming, Punching, & Shearing)	C.C.S. Hot Work	H14	C .40, Mn .30, Si 1.15, Cr 5.25, W 4.25	Air Movement + A
Hot Work Dies (Forming, Punching, & Shearing)	CHRO-MOW Hot Work	H12	C .35, Mn .35, Si 1.05, Cr 5.00, V .25, W 1.25, Mo 1.35	Air Movement + A
Hot Work Dies (Forming, Punching, & Shearing)	PEERLESS A Hot Work	H21	C .30, Mn .30, Si .30, Cr 3.35, V .25, W 9.00	Air or Oil Movement + A
Hot Work Dies (Forming, Punching, & Shearing)	PEERLESS LCT #2 Hot Work	H22	C .40, Mn .30, Si .30, Cr 2.00, V .35, W 11.50	Air or Oil Movement + A
Hot Work Dies (Forming, Punching, & Shearing)	PEERLESS 56 Hot Work		C .40, Mn .55, Si 1.00, Cr 3.25, V .33, Mo 2.50	Oil Movement + B
Hot Work Dies (Forming, Punching, & Shearing)	REX AA OX TEMPER Hot Work		C .65, Mn .30, Si .30, Cr 4.00, V 1.10, W 18.00	Air or Oil Movement + A
Hot Work Dies (Forming, Punching, & Shearing)	REX AA (PX Temper) Hot Work	H26	C .55, Mn .30, Si .30, Cr 4.00, V 1.10, W 18.00	Air or Oil Movement + A
Plastic Molding Dies (Ejector Pins)	VICTOR DRILL ROD Water or Oil Hardening		C 1.00	Water or Oil Movement —C
Plastic Molding Dies (Ejector Pins)	(See NuDIE V, KETOS, Listed Above)			
Plastic Molding Dies (Hubbed Cavities)	FORMOLD Oil Hardening	P2	C .10 Max., Mn .80, Si .15, Ni .55, Cr 2.00, Mo .20	Oil Movement + A
Plastic Molding Dies (Hubs)	(See AIRDI 150, AIRKOOL, ATHA PNEU, KETOS, LaBELLE SILICON #2, Listed Above)			
Plastic Molding Dies (Machine Cut Cavity)	CSM #2 Oil Hardening	P20	C .30, Mn .80, Cr .80, Mo .25, Si .50	Oil Movement + A
Plastic Molding Dies (Machine Cut Cavity)	(See AIRKOOL, KETOS, NuDIE V, Listed Above)			
Punching and Shearing	(See AIRDI 150, AIRKOOL, ALVA EXTRA, ATHA PNEU, HALVAN, KETOS, REX AA, REX M-2, LaBELLE SILICON #2, LaBELLE HT)			
Shock Resisting	LaBELLE HT Oil Hardening		C .45, Mn 1.35, Si 2.30, Cr 1.40, V .30, Mo .40	Oil Movement + B
Shock Resisting (Intermittent Impact)	ALVA EXTRA	W2	C .95, Mn .25, Si .20, V .20	Water, Brine Movement —C
Shock Resisting (Intermittent Impact)	BLACK DIAMOND	W1	C 1.05, Mn .25, Si .25	Water, Brine Movement —C
Shock Resisting (Repeated Impact)	HALVAN Oil Hardening	L2	C .50, Mn .80, Si .30, Cr 1.00, V .20	Oil Movement + B
Shock Resisting (Repeated Impact)	(See ATHA PNEU, LaBELLE SILICON #2, LaBELLE HT, Listed Above)			

DARWIN & MILNER INC., 2345 St. Clair Ave., Cleveland 14, Ohio — Listing No. 19

Cold Forming	DARWIN BRAKE DIE Oil Hardening		C .50, Mn 1.00, Cr .85, Mo .15	Oil	Mach. 60
Cold Work Dies	CV Water Hardening	W2	C .95, V .20	Water	Mach. 100 Movement B
Cold Work Dies	DARWIN #1 Air Hardening	D2	C 1.50, Mn .35, Cr 13.00, Mo .75, V .25, Si .40, Ni .40	Air	Mach. 50 Movement A
Cold Work Dies	DARWIN FLAME HRD Air Hardening		C .50, Mn 1.20, Cr 1.40, Mo .40, V .10, Si .50	Air	Mach. 75 Movement B
Cold Work Dies	H BRAND Oil Hardening	O2	C .90, Mn 1.50, Mo .30, Si .25	Oil	Mach. 90 Movement A
Cold Work Dies	MINEOR Air Hardening	A2	C 1.00, Mn .60, Cr 5.00, Mo 1.00, V .25, Si .40	Air	Mach. 65 Movement B
Cold Work Dies	OHT Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, Si .35	Oil	Mach. 85 Movement A
Cold Work Dies	TEMPER TOUGH Oil Hardening	L6	C .75, Mn .60, Cr .80, Mo .30, V .15, Si 1.15	Oil	Mach. 75 Movement B
Cold Work Dies (Blanking, Cold Forming)	NEOR Oil Hardening	D3	C 2.10, Mn .60, Cr 13.00, Si .40, Ni .50	Oil	Mach. 40 Movement A
Cold Work Dies (Blanking, Cold Forming)	PRK-33 Air Hardening	D5	C 1.40, Mn .30, Cr 13.00, Mo .60, Co 3.30, Si .60, Ni .50	Air	Mach. 50 Movement A
Cutting Tools	CANNON Oil, Air Hardening	T1	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .35	Oil, Air	Mach. 50 Movement B
Cutting Tools	CANNON SPECIAL Oil, Air Hardening	T2	C .80, Mn .25, Cr 4.00, W 18.00, Mo .60, V 2.00, Si .30	Oil, Air	Mach. 50 Movement B
Cutting Tools	DARWIN 505 Oil, Air Hardening	T1	C .70, Mn .30, Cr 4.00, W 18.00, Mo .60, V 1.15, Co 5.00, Si .25	Oil, Air	Mach. 50 Movement B
Cutting Tools	DARWIN 505 SPECIAL Oil, Air Hardening	T5	C .80, Mn .30, Cr 4.00, W 18.00, Mo .80, V 2.00, Co 8.00, Si .25	Oil	Mach. 45 Movement B
Cutting Tools	DARWIN 1366 Oil Hardening	T6	C .80, Mn .30, Cr 4.00, W 18.00, Mo .80, V 2.00, Co 13.00, Si .25	Oil	Mach. 45 Movement B
Cutting Tools	DARWIN M-3 Oil Hardening	M3	C 1.10, Cr 4.00, W 5.75, Mo 5.00, V 2.50	Oil	Mach. 55 Movement B
Cutting Tools	MT-6 Oil Hardening	M2	C .85, Mn .25, Cr 4.00, W 6.00, Mo 6.00, V 1.50, Si .25	Oil	Mach. 55 Movement B
Fast Finishing	EE Water, Oil Hardening	W4	C 1.50, Mn .30, Cr .20, W 4.50, V .35, Si .30	Oil, Water	Mach. 65 Movement B
Hot Work	DARWIN 93 Oil Hardening	H21	C .30, Cr 3.00, W 9.00, V .45	Oil	Mach. 60 Movement A
Hot Work	FIREX SPECIAL Air Hardening	S10A	C .50, Mn .65, Cr .85, Mo .60, V .20, Si .30, Ni 4.00	Air	Mach. 40 Movement A
Hot Work	IWI Oil Hardening	H24	C .45, Mn .25, Cr 4.00, W 15.00, V .70, Si .30	Oil	Mach. 50 Movement B
Hot Work Dies	HWA Air Hardening	H13	C .35, Cr 5.00, Mo 1.00, V 1.00, Si 1.00	Air	Mach. 70 Movement B
Hot Work Dies	HWS Oil, Air Hardening	H12	C .33, Cr 5.00, W 1.25, Mo 1.45, V .23, Si .55	Air, Oil	Mach. 70 Movement B

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Molding	HOBALITE Water Hardening		C .05, Mn .15, Si .01	Water Mach. 110 Movement B
Punches & Dies	SSC Water Hardening	W1	C 1.00, Mn .30, Si .50	Water Mach. 100 Movement C
Shock Resisting	XTRA TOUGH Water, Oil Hardening	S5	C .58, Mn .70, Mo .40, V .25, Si 1.85	Oil, Water Mach. 100 Movement B
Shock Resisting	W BRAND Oil Hardening	S3	C .45, Mn .35, Cr .80, W .85, Si .30	Oil Mach. 85 Movement B
Shock Steel	IDEOR Oil Hardening	S1	C .50, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil Mach. 85 Movement B

DELAWARE TOOL STEEL CORP., 34th & Market St., Wilmington 99, Del. — Listing No. 20

Shock Resisting	DELAIR	A2	C, Mn, Si, Cr, Mo	Air Mach. 90 Movement A
Shock Resisting	DELAWARE EXTRA	W1	C, Mn, Si, Va	Water Mach. 100 Movement C
Shock Resisting	DELAWARE H.S.	M2	C, Mn, Si, Cr, W, Mo, Va	Air Mach. 60 Movement A
Shock Resisting	DELAWARE S.T		C, Mn, Si, Mo, Va	Water Mach. 100 Movement B
Shock Resisting	DELAWARE STANDARD	W1	C, Mn, Si	Water Mach. 100 Movement C
Shock Resisting	DELAWARE SUPERIOR		C, Mn, Si, Cr, W, Mo, Va, Co	Air Mach. 60 Movement A
Shock Resisting	DELSTEEL ALLOY	S5	C, Mn, Si, Mo, Va	Oil, Water Mach. 80 Movement B

DIEHL STEEL CO., 1608 John St., Cincinnati 14, Ohio — Listing No. 21

Cold Work (Blanking-Forming Punches, Etc.)	KROVAN Air Hardening	A2	C 1.0, Mn .7, Si .3, Cr 5.2, Mo 1.1, V .2	Air
Cold Work Dies (Blanking, Cold Forming)	GRADE "A" Water Hardening	W1, GR1	C .95, Mn .30, Si .20	Water Movement A
Cold Work Dies (Blanking, Cold Forming)	UTEX Oil Hardening	O1	C .95, Mn 1.00, Cr .50, W .60, V .25, Si .25	Oil
Cold Work Dies (Cold Forming)	HICRO Oil Hardening	D2, D3	C 1.55, Mn .25, Cr 12.00, Mo .80, V .35, Si .35	Oil, Air
Cold Work Dies (Punches, Small Tools)	VERI BEST DRILL ROD Oil Hardening	O1	C .95, Mn 1.05, Cr .55, W .65, V .15, Si .35	Oil
Cutting Tools	BLUE STREAK MOLY Oil Hardening, High Speed	M2	C .80, Cr 4.00, W 5.75, Mo 4.50, V 1.60	Oil
Cutting Tools	BLUE STREAK 18-4-1 Oil Hardening	T1	C .72, Cr 4.00, W 18.00, V 1.00	Oil
Hot Work Dies	A. M. D. Air Hardening		C .34, Mn .40, Cr 4.75, W 1.10, Mo 1.45	Air
Punching, Shearing	(See Grade "A" UTEX, Listed Above)			
Ring Cold Work Dies	HOLLOBAR Oil Hardening	O1	C 1.05, Mn .38, Cr 1.46, Si .28	Oil

DISSTON DIV., H. K. PORTER COMPANY INC., Unruh & Milnor Sts., Philadelphia 35, Pa. — Listing No. 22

Cold Work Dies	NICROMAN Oil Hardening	L6	C .70, Mn .45, Cr 1.00, Si .20, Ni 1.65	Oil Mach. 80 Movement A
Cold Work Dies (Blanking, Cold Forming)	BEST CARBON Water Hardening	W1	C as ord., Mn .20, Si .20	Water Mach. 100 Movement B
Cold Work Dies (Blanking, Cold Forming)	CRAIRMO Air Hardening	A2	C 1.00, Mn .50, Si .30, Cr 5.00, V .30, Mo 1.00	Air Mach. 80 Movement A
Cold Work Dies (Blanking, Cold Forming)	CROLOY Oil Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .80, V .95, Si .30	Oil Mach. 60 Movement A
Cold Work Dies (Blanking, Cold Forming)	D-9-Mo Water Hardening		C 1.15, Mn .60, Mo .20, Si .50	Water Mach. 95 Movement A
Cold Work Dies (Blanking, Cold Forming)	D-9-Va Water, Oil Hardening	W3	C 1.15, Mn .60, V .20, Si .60	Oil, Water Mach. 95 Movement A
Cold Work Dies (Blanking, Cold Forming)	MANSIL Oil Hardening	O1	C .90, Mn 1.15, Cr .50, W .50, Si .35	Oil Mach. 85 Movement A
Cold Work Dies (Blanking, Cold Forming)	VA-TOOL Water Hardening	W2	C .95, Mn .25, Cr .15, V .25, Si .20	Water Mach. 95 Movement A
Cutting Tools	(See D-9-Mo, D-9-Va, Listed Above)			
Cutting Tools (Finishing)	D-6-CO Oil Hardening	T4	C .75, Mn .25, Cr 4.00, W 18.25, Mo .65, V 2.00, Co 5.75, Si .20	Oil Mach. 55 Movement B
Cutting Tools (Finishing)	No. 844 Oil Hardening	L1	C .85, Mn .30, Cr .80, Si .25	Oil Mach. 80 Movement B
Cutting Tools (Finishing, Glass, Leather, etc.)	No. 871 Oil Hardening		C .55, Mn .65, Mo .20, Si .20	Oil Mach. 90 Movement B
Cutting Tools (Finishing, Wood, Plastic)	POLARIS Oil Hardening		C .85, Mn .30, Cr .15, Si .25, Ni .70	Oil Mach. 100 Movement A
Cutting Tools (Finishing)	TUNGSTEN HACK Oil Hardening		C .90, Mn .20, W 1.00, V .15, Si .15	Oil Mach. 85 Movement B
Cutting Tools (Roughing, Finishing)	KUTKWIK Oil Hardening	T1	C .75, Mn .25, Cr 4.00, W 18.25, Mo .80, V 1.10, Si .25	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	6N6-M2 Oil Hardening	M2	C .82, Mn .25, Cr 4.25, W 6.35, Mo 5.00, V 1.90, Si .35	Oil Mach. 65 Movement A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Diecasting Dies	No. 872 Oil Hardening	H21	C .35, Mn .30, Cr 3.25, W 9.25, V .30, Si .35	Oil Mach. 80 Movement A
Hot Work Dies (Punching, Shearing, Forming)	No. 873 Oil Hardening	H12	C .38, Mn .35, Cr 5.00, W 1.25, Mo 1.35, V .40, Si 1.00	Oil Mach. 85 Movement A
Hot Work Dies (Punching, Shearing, Forming)	No. 877 Oil Hardening	H13	C .35, Mn .30, Si .30, Cr 5.00, V 1.00, Mo 1.50	Oil Mach. 85 Movement A
Hot Work Dies (Forming)	KEYSTONE Oil Hardening	S1	C .50, Mn .30, Cr 1.10, W 2.00, V .20, Si .20	Oil Mach. 85 Movement B
Hot Work Dies (Forming)	No. 872	(Listed Above)		
Plastic Molding Dies (Hubs)	CROLOY	(Listed Above)		
Plastic Molding Dies (Hubbed Cavity Dies)	PLASTALLOY Water Hardening	P3	C .10 Max., Mn .45, Cr .50, Si .20 Max., Ni 1.20	Water Mach. 95 Movement B
Plastic Molding Dies (Hubbed Cavity Dies)	PLASTIRON Water Hardening	P1	C .10 Max., Mn .15, Si .20 Max.	Water Mach. 95 Movement B
Punching, Shearing	EXTRA CARBON Water Hardening	W1	C 1.00, Mn .20, Si .20	Water Mach. 100 Movement B
Punching, Shearing	STANDARD Water Hardening	W1	C 1.00, Mn .20, Si .20	Water Mach. 100 Movement B
Punching, Shearing	S12 DIE Oil Hardening	D3	C 1.80, Mn .30, Cr 12.25, Si .25	Oil Mach. 50 Movement A
Punching, Shearing	(See BEST CARBON, CROLOY, MANSIL, NICROMAN, Listed Above)			
Shock Resisting (Repeated Impact)	D29 Oil Hardening	S5	C .55, Mn .80, Mo .40, Si 1.35	Oil Mach. 80 Movement B
Shock Resisting (Repeated Impact)	KEYSTONE	(Listed Above)		

DoALL CO., 254 No. Laurel Ave., Des Plaines, Ill. — Listing No. 23

Cold Work Dies	OIL HARDENING	O1	C .90, Mn 1.20, Cr .50, W .50, Si .30, V .20	Oil Mach. 100 Movement A
Cold Work Dies (Lamination Dies, etc.)	AIR HARDENING	A2	C 1.00, Mn .50, Cr 5.00, Mo 1.25, V .30, Si .25	Air Mach. 85 Movement B
Cutting Tools (Chip Removal, Cast Iron and Nonferrous, Roughing)	DO-1, Carbide			
Cutting Tools (Chip Removal, Cast Iron and Nonferrous, General Purpose)	DO-2, Carbide			
Cutting Tools (Chip Removal, Cast Iron and Nonferrous, Precision Boring, Light Finishing)	DO-3, Carbide			
Cutting Tools (Chip Removal, Steel, Roughing)	DO-5, Carbide			
Cutting Tools (Chip Removal, Steel, General Purpose)	DO-6, Carbide			
Cutting Tools (Chip Removal, Steel, Finishing)	DO-7, Carbide			
Cutting Tools (Chip Removal, Steel, Precision Boring)	DO-8, Carbide			
Cutting Tools (Chip Removal, Steel, Interrupted Cuts, High Heat Resistant)	DO-16, Carbide			
Wear Surface (No Shock)	DO-2, Carbide			
Wear Surface (Light Shock)	DO-10, Carbide			
Wear Surface (Heavy Shock)	DO-11, Carbide			
Impact (Light)	DO-10, Carbide			
Impact (Medium)	DO-13, Carbide			
Impact (Heavy)	DO-14, Carbide			

FAITOUTE IRON & STEEL CO. INC., 182 Frelinghuysen Ave., Newark 8, N. J. — Listing No. 24

Cold Work Dies	FISCO CARBON Water Hardening	W1	C 1.05	Water Mach. 100 Movement + C
Cold Work Dies	FISCO CHROMDIE Air Hardening	D2	C 1.60, Cr 12.00, Mo .85, V .23	Air Mach. 45 Movement + A
Cold Work Dies	FISCO OILHARD Oil Hardening	O1	C .90, Mn 1.15, Cr .50, W .50, V .20	Oil Mach. 90 Movement + B
Cold Work Dies	FISCO SPECIAL Water Hardening	W1	C 1.05	Water Mach. 100 Movement + C
Cutting Tools	FISCO HIGH SPEED High Speed	T1	C .72, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 60 Movement ±A
Cutting Tools	(See FISCO CARBON, FISCO SPECIAL, Listed Above)			
Shock Resisting (Intermittent Impact)	FISCO DUPLEX Water Hardening	W1	C .85	Water Mach. 100 Movement + C
Shock Resisting (Repeated Impact)	FISCO OMEGA Water, Oil Hardening	S5	C .60, Mn .80, Mo .50, V .25, Si 1.85	Oil, Water Mach. 65 Movement ±B

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "−" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

A. FINKL & SONS CO., 2011 Southport Ave., Chicago 14, Ill. — Listing No. 25

Hot Work Dies (Hot Forgings)	F Water Hardening		C, Mn	Water Movement B
Hot Work Dies (Hot Forming)	CUPRODIE		Cr, Mo, Cu, Ni	Hardened
Hot Work Dies (Hot Forming)	DURODI Oil, Air Hardening		Cr, Mo, Si, Ni	Oil, Air Blast Movement A
Hot Work Dies (Hot Forming)	FS		Cr, Mo, Ni	Oil Movement A
Hot Work Dies (Hot Forming)	FX		Cr, Mo, Ni	Hardened
Hot Work Dies (Hot Forming)	SHELLDIE Air Hardening		Cr, Mo, Si	Air Movement A
Hot Work Dies (Hot Forming)	SHELLEX		Cr, Mo, Si, V	Air Movement A
Hot Work Dies (Hot Forming)	WHX		Cr, Mo, Si, W	Air Movement A
Punching, Shearing (Cold, Hot Trimming)	COLD HOT Water, Oil Hardening		Cr, Mo	Oil, Water Movement A

FIRTH-LOACH METALS INC., Buttermilk Hollow Rd., P.O. Box 486, McKeesport, Pa. — Listing No. 26

Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, Heavy Roughing or Interrupted Cutting)	FA-3, Carbide
Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, Heavy Roughing or Light, Interrupted Cutting)	FA-4, Carbide
Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, General Machining and Wear-Resistant Applications)	FA-5, Carbide
Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, General Purpose Machining)	FA-6, Carbide
Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, Finishing)	FA-7, Carbide
Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, Fine Finishing)	FA-8, Carbide
Cutting Tools (Steel and Steel Alloys, Heavy Roughing or Interrupted Cutting)	FT-3, Carbide
Cutting Tools (Steel and Steel Alloys, General Machine Shop Work)	FT-4, Carbide
Cutting Tools (Steel and Steel Alloys, Boring and Forming Locomotive Car Wheels)	FT-5, Carbide
Cutting Tools (Steel and Steel Alloys, Fine Finishing)	FT-6, Carbide
Cutting Tools (Steel and Steel Alloys, Precision Boring, Light Finishing)	FT-7, Carbide
Blanking Dies and Punches (Heavy Punches and Die Sections, Heavy Shock)	FB-3, Carbide
Blanking Dies and Punches (General Work)	FB-4, Carbide
Blanking Dies and Punches (Slitter Knives, Wear Parts, Punches for Thicker Metals)	FB-5, Carbide
Blanking Dies and Punches (Small Rolls, Wear Parts, Punches for Blanking Thin, Ductile Materials)	FB-6, Carbide
Draw Dies (For Drawing Wire, Tube and Bar Stock)	FD-3, Carbide
Draw Dies (For Drawing Wire, Tube and Bar Stock)	FD-4, Carbide
Draw Dies (For Drawing Wire, Tube and Bar Stock)	FD-5, Carbide
Heading Dies and Punches	FH-3, Carbide
Heading Dies and Punches	FH-4, Carbide
Heading Dies and Punches	FH-5, Carbide
Heading Dies and Punches	FH-6, Carbide
Mining Tools (Rock Bits)	FM-3, Carbide
Mining Tools (Coal Mining)	FM-4, Carbide
Mining Tools (Auger Bits)	FM-5, Carbide
Mining Tools (Auger Bits)	FM-6, Carbide

FIRTH STERLING INC., 3113 Forbes St., Pittsburgh 30, Pa. — Listing No. 27

Boring Tool (Hardest Material)	FIRTHITE HF, Carbide		WC 97, Co 3	
Boring Tool (High Speed)	FIRTHITE T31, Carbide		WC 67, Co 8, C 25	
Cold Work Dies	AIRVAN Air Hardening	A2	C 1.00, Cr 5.25, Mo 1.15, V .30	Air, Oil Mach. 70 Movement A
Cold Work Dies	A.W. SPECIAL Water, Oil Hardening	L3	C 1.00, Cr 1.45, V .20	Water, Oil Mach. 85 Movement A
Cold Work Dies	C.E.S. Air, Oil Hardening		C .60, Mn .50, Si .30, Cr 1.15, Mo .25, Ni 3.25	Air, Oil Mach. 50 Movement A
Cold Work Dies	CROMOVAN DIE Air Hardening	D2	C 1.55, Cr 12.00, Mo 1.00, V 1.00	Air, Oil Mach. 45 Movement A
Cold Work Dies	C.H.Q. Water Hardening	W1	C .95	Brine, Water Mach. 100 Movement C
Cold Work Dies	INVARO #1 Oil Hardening	O1	C .90, Mn 1.15, Cr .50, W .50, V .20	Oil Mach. 90 Movement A
Cold Work Dies	INVARO #2 Oil Hardening	O2	C .90, Si .25, Mn 1.65, Mo .35, V .15	Oil Mach. 90 Movement A
Cold Work Dies	METEOR Water, Oil Hardening	F1	C 1.22, Mn .30, Cr .35, W 1.45, V .15	Water, Oil Mach. 85 Movement A
Cold Work Dies	NITRARD No. 1 Air Hardening	D2	C 1.55, Cr 12.00, Mo 1.00, V 1.00	Oil, Air Mach. 45 Movement A
Cold Work Dies	SILVER DIE No. 1 Water Hardening	W1	C .92	Brine, Water Mach. 100 Movement C
Cold Work Dies	SILVERDIE No. 2 Water Hardening	W1	C .95, Mn .40, Si .38	Brine, Water Mach. 100 Movement C
Cold Work Dies	STAR BLUE CHIP High Speed	T7	C .73, Cr 4.75, W 14.00, V 1.65	Oil, Air Mach. 55 Movement A
Cold Work Dies	TRIPLE DIE Oil Hardening	D3	C 2.20, Cr 12.00, V .25	Oil, Air Mach. 40 Movement A
Cold Work Dies, Tools	DIAMOND M Water Hardening	W1	C 1.30, Cr .28	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. BEST Water Hardening	W1	C As Spec.	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. EXTRA Water Hardening	W1	C As Spec.	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. SPECIAL Water Hardening	W1	C As Spec.	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	GLOBE DRILL ROD Water Hardening	W1	C 1.25	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SILVAN STAR Water Hardening	W2	C 1.00, V .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SILVER STAR Water Hardening	W1	C 1.00	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SPECIAL A.S.V. Water Hardening	W1	C 1.00	Brine, Water Mach. 100 Movement C

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies, Tools	STERLING Water Hardening	W1	C 1.00	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING V Water Hardening	W2	C 1.00, V .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STER M Water Hardening	W4	C 1.25, Cr .25	Brine, Water Mach. 100 Movement C
Cutting Tools (Light Interrupted Cuts, Slow Speeds, Cast Iron and Nonferrous Materials)	FIRTHITE H, Carbide		WC 94, Co 6	
Cutting Tools (General Purpose Work, Cast Iron and Nonferrous Materials)	FIRTHITE HA, Carbide		WC 90.5, Co 6.5, TiC 3	
Cutting Tools (General Purpose, Cast Iron, Nonferrous, Metal Machining)	FIRTHITE HAX, Carbide		WC 94.25, Co 5.75	
Cutting Tools (Rough Intermittent Cuts, Coarse Feeds, Cast Iron and Nonferrous Materials)	FIRTHITE HB, Carbide		WC 92, Co 8	
Cutting Tools (Strongest WC Grade, Skiving, Cast Iron and Nonferrous Materials)	FIRTHITE HC, Carbide		WC 87, Co 13	
Cutting Tools (Light Cuts, Fine Feeds, Cast Iron and Nonferrous Materials)	FIRTHITE HE, Carbide		WC 96, Co 4	
Cutting Tools (Rough Intermittent Cuts, Steel)	FIRTHITE T04, Carbide		WC 86, Co 10, TiC 4	
Cutting Tools (Heavy Duty, Steel)	FIRTHITE TXH, Carbide		WC 83, Co 8.0, TiC 9	
Cutting Tools (Light Steady Cuts, Fine Feeds, Steel)	FIRTHITE T16, Carbide		WC 76, Co 8, TiC 16	
Cutting Tools (Precision Boring, Steel)	FIRTHITE T31, Carbide		WC 68.5, Co 6.5, TiC 25	
Cutting Tools (Hot Flash Trim, Welded Tubing)	FIRTHITE T66, Carbide		WC 60, Co 12, TaC 28	
Cutting Tools (High Speed Finishing)	FIRTHITE WF, Cermet		TiC 70, Mo_2C 18, Ni 12	
Cutting Tools	BLUE CHIP High Speed	T1	C .73, Cr 4.00, W 18.00, V 1.10	Oil, Air Mach. 55 Movement A
Cutting Tools	CIRCLE C High Speed	T5	C .77, Cr 4.50, W 18.50, Mo 1.00, V 2.00, Co 9.00	Oil, Air Mach. 40 Movement A
Cutting Tools	CIRCLE M High Speed	M36	C .85, W 6.00, Cr 4.00, Mo 5.00, Co 9.00, V 2.00	Oil, Air Mach. 45 Movement A
Cutting Tools	RED CHIP High Speed	T4	C .75, Cr 4.00, W 18.00, Mo .75, V 1.10, Co 5.00	Oil, Air Mach. 50 Movement A
Cutting Tools	FS2-5 High Speed	T5	C .80, Cr 4.00, W 14.00, Mo .75, V 2.00, Co 5.00	Oil, Air Mach. 45 Movement A
Cutting Tools	FS M-2½ High Speed	M3	C 1.00, W 6.00, Cr 4.10, V 2.40, Mo 5.75	Air, Oil Mach. 50 Movement A
Cutting Tools	FS M-10 High Speed	M10	C .85, Cr 4.25, V 2.00, Mo 8.25	Oil, Air Mach. 60 Movement A
Cutting Tools	HI-MO High Speed	M1	C .80, Cr 4.00, W 1.60, Mo 8.70, V 1.25	Oil, Air Mach. 60 Movement A
Cutting Tools	H.V. BLUE CHIP High Speed	T2	C .83, Cr 4.00, W 18.50, Mo .75, V 2.00	Oil, Air Mach. 45 Movement A
Cutting Tools	MO CHIP High Speed	M20	C .59, Cr 5.00, Mo 8.00, V 1.25, Co 2.50, B .25	Oil, Air Mach. 55 Movement A
Cutting Tools	R.T. STEEL Water Hardening	F2	C 1.30, Cr .25, W 3.50	Brine, Water Mach. 60 Movement C
Cutting Tools	STAR-MO M2 High Speed	M2	C .83, Cr 4.00, W 6.40, Mo 5.00, V 2.00	Oil, Air Mach. 55 Movement A
Cutting Tools	SUPER HI-MO High Speed	M30	C .80, Cr 4.00, W 1.80, Mo 8.50, V 1.25, Co 5.00	Oil, Air Mach. 55 Movement A
Cutting Tools	SUPER MO CHIP High Speed	M40	C .59, Cr 4.20, W 1.65, Mo 8.15, V 1.80, Co 8.20, B .50	Oil, Air Mach. 40 Movement A
Cutting Tools	VAN CHIP	M3	C 1.15, Cr 4.10, W 6.00, Mo 5.75, V 3.00	Oil, Air Mach. 55 Movement A
Diecasting Dies	B.D.C. Oil, Air Hardening	H23	C .33, Mn .35, Cr 12.00, W 12.00, V 1.05, Si .35	Oil, Air Mach. 50 Movement A
Diecasting Dies	L.T. FORGING DIE Oil, Air Hardening	H21	C .30, Cr 3.50, W 9.50, V .50	Air, Oil Mach. 60 Movement A
Drawing Dies	R.T. STEEL (Listed Above)			
General Purpose	FIRTHITE HA, Carbide (Listed Above)			
General Purpose	FIRTHITE TA, Carbide		WC 84, Co 6.5, Ti 9.5	
Hot Work Dies	C.Y.W. Oil, Air Hardening		C .95, Mn .50, Cr 3.60	Air, Oil Mach. 80 Movement A
Hot Work Dies	H.W.D. #1 Air Hardening	H12	C .35, W 1.40, Cr 5.00, V .30, Mo 1.55, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. #2 Air Hardening	H11	C .37, Cr 5.25, V .50, Mo 1.35, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. #3 Air Hardening	H13	C .40, Cr 5.25, V 1.00, Mo 1.25, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. (Mod.)	H12 (Mod.)	C .55, W 1.40, Cr 5.00, V .30, Mo 1.55, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	L.T.L. Grade Air, Oil Hardening	H21	C .25, W 10.0, Cr 2.75, Ni 1.50, V .25	Air, Oil Mach. 60 Movement A
Hot Work Dies	XDH Oil, Air Hardening	H26	C .55, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 60 Movement A
Hot Work Dies	XDL Oil, Air Hardening	H25	C .38, Cr 3.50, W 14.00, V .50	Oil, Air Mach. 60 Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work Dies	XDM Oil, Air Hardening	H26	C .50, Cr 3.50, W 18.00, V .95	Oil, Air Mach. 65 Movement A
Hot Work Dies	(See B.D.C., H.W.D., L.T. FORGING DIE, Listed Above)			
Punching and Shearing	CHIMO PUNCH Water, Oil Hardening	S5	C .55, Mn .95, Cr .15, Mo .50, V .20, Si 2.00	Water, Oil Mach. 85 Movement B
Punching and Shearing	DEMMLER D Water, Oil Hardening	L2	C .52, Mn .85, Cr 1.00, V .20	Water, Oil Mach. 75 Movement C
Punching and Shearing	J.S. PUNCH Oil Hardening	S1	C .50, Cr 1.40, W 2.50, V .25	Oil Mach. 80 Movement A
Shock Resisting	(See CHIMO PUNCH, DEMMLER D, J.S. PUNCH, C.E.S., Listed Above)			
Shock Resisting (Bolt Heading)	FIRTHITE ND20, Carbide		WC 75, Co 20, Ta 5	
Shock Resisting (Punches, Cold Heading)	FIRTHITE ND25, Carbide		WC 70, Co 25, Ta 5	
Shock Resisting (Punches, Cold Heading, Extreme Service Requirements)	FIRTHITE ND27, Carbide			
Wear Parts (Guides, Gage Blocks)	FIRTHITE T41H, Carbide		WC 82, Co 8, Ta 10	
Wear Parts (Gage Components, Balls)	FIRTHITE CR-1, Chromium Carbide		Chromium Carbides 89, Ni 11	
Wear Parts (Valve Trim, Hot Extrusion)	FIRTHITE CR-2, Chromium Carbide		Chromium Carbides 84, Ni 16	
Wear Parts (Nozzles, Erosion Resistance)	FIRTHITE CR-3, Chromium Carbide		Chromium Carbides 70, Ni 15, TiC 15	

GREAT WESTERN STEEL CO. INC., Division of Hoyland Steel Co. Inc., 1011 E. 61st St., Los Angeles 1, Calif.

Listing No. 28

Cold Work Dies	GW COLD HEADER DIE STEEL Water Hardening	W1	(Secure special information from manufacturer)	
Cold Work Dies	GW-CVM Air Hardening	A2	C .95-1.05, Mn .60-.80, Cr 5.00-5.50, Mo .95-1.25, V .20-.30, Si .20-.40	Air
Cold Work Dies	GW-CW-OIL Oil Hardening	O1	C .85-.95, Mn 1.00-1.20, Cr .40-.60, W .40-.60, Si .25-.45	Oil
Cold Work Dies	GW-EXTRA Water Hardening	W1	C 1.00-1.10, Mn .25-.35, Si .25-.35	Water
Cold Work Dies	GW-SPECIAL Water Hardening	W1	C 1.00-1.20, Mn .25-.35, Si .20-.30	Water
Cold Work Dies	GW-350-FAST FINISHING Water Hardening		C 1.25-1.35, Mn .20-.40, W 3.00-4.00, Si .45	Water
Cold Work Dies (Stamping and Forming)	GW-L97		C .55, Cr 1.00, Ni 3.00, Mo .35	Air, Oil
Cold Work Dies (Blanking)	GW-265-HIGH PRODUCTION Oil, Air Hardening	D2	C 1.55-1.70, Mn .25-.35, Cr 11.50-12.50, Mo .70-.90, V .15-.25, Si .25-.35	Air, Oil
Cold Work Dies (Blanking)	GW-265-H-HIGH PRODUCTION	D3	C 2.05, Mn .40, Cr 11.50, V .60	Air, Oil
Cold Work Tools	GW-REGULAR Water Hardening	W1	C as specified, Mn .20-.35, Si .25-.35	Water
Cutting Tools (Roughing)	GW SILVER STRIPE Oil, Air Hardening	T1	C .70-.75, Mn .10-.30, Cr 3.75-4.25, W 17.50-18.50, V .95-1.15, Si .25-.40	Oil, Air
Cutting Tools (Roughing)	GW SUPER-KUT Oil, Air Hardening	T4	C .68-.75, Mn .10-.30, Cr 3.75-4.25, W 16.75-17.75, Mo .40-.60, V .95-1.15, Co 4.25-4.75, Si .25-.40	Oil, Air
Cutting Tools (Roughing)	GW 6-6-2 Oil, Air Hardening	M2	C .75-.85, Mn .20-.30, Cr 3.90-4.30, W 5.50-6.00, Mo 4.50-5.50, V 1.40-1.75, Si .20-.40	Oil, Air
Cutting Tools (Finishing)	(See GW-SPECIAL, GW-EXTRA, GW-350, Listed Above)			
Hot Work Dies	GW-99-HOT WORK Air Hardening	H12	C .30-.35, Mn .30-.40, Cr 4.50-5.00, W 1.00-1.20, Mo 1.40-1.60, Si .80-1.00	Air
Hot Work Dies	GW-99-VAN-HOT WORK Air Hardening	H13	C .40, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air
Hot Work Dies	GW-310-HOT WORK Oil, Air Hardening	H21	C .28-.33, Mn .20-.30, Cr 3.00-3.50, W 9.50-10.50, V .25-.50, Si .20-.40	Oil, Air
Hot Work Dies	GW-313-HOT WORK Oil, Air Hardening	H25	C .35-.40, Mn .20-.35, Cr 2.75-3.25, W 13.00-14.00, Si .20-.40	Oil, Air
Hot Work Dies	GW-515-HOT WORK Air Hardening		C .35-.40, Mn .20-.35, Cr 4.80-5.30, W 4.80-5.30, Mo .15-.30, Si .80-1.10	Air
Plastic Molding Dies	GW REMA IRON		C .05-.07, Mn .15-.20	
Plastic Molding Dies	GW REMA B		C .07, Mn .30, Si .15, Cr 1.00, Mo .25	Oil
Shock Resisting (Repeated Impact)	GW-280-TUFKUT Water Hardening	S5	C .50-.55, Mn .60-.80, Mo .30-.40, Si 1.30-1.60	Water
Shock Resisting (Repeated Impact)	GW-422-MIRYCAL Water, Oil Hardening	S1	C .45-.50, Mn .20-.50, Cr .85-1.05, W .90-1.20, Mo .15-.25, Si .15-.30	Water, Oil

HAWKRIDGE BROS. CO., 303 Congress St., Boston 10, Mass.

Listing No. 29

Cold Work Dies (Blanking)	KETOS Oil Hardening	O1	C .90, Mn 1.25, Cr .50, W .50	Oil
Cold Work Dies (Blanking)	HAWK AIRFAK Air Hardening	A2	C 1.00, Mn .40, Cr 5.25, Mo 1.15, V .40	Air, Oil or Liquid Bath
Cold Work Dies (Blanking) (Ground Stock)	HAWK PREFAK Oil Hardening	O1	C .90, Mn 1.25, Cr .50, W .50	Oil

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking)	HAWK 777 Oil Hardening		C .70, Mn .90, Mo .80, Si .30	Oil
Cold Work Dies (Blanking)	HAWK 977 Oil Hardening		C .90, Mn .90, Mo .80, Si .30	Oil
Cold Work Dies (Striking)	HAWK ADAMANT Oil Hardening	W1	C .50, Mn .50, Cr 1.12, Ni 3.25, Mo .25	Oil, Air or Liquid Bath
Cold Work Dies (Cold Forming)	HAWK BRAND Water Hardening	W1	C 1.00/1.10	Water, Brine
Cold Work Dies (Cold Forming)	HAWK COLD HEADING DIE Water Hardening	W1	C .85/.95	Water, Brine
Cold Work Dies (Cold Forming)	HAWK SPECIAL Water Hardening	W1	C 1.20/1.30	Water, Brine
Cold Work Dies (Cold Forming)	HAWK VANADIUM Water Hardening	W2	C .95/1.05, V .15/.30	Water, Brine
Plastic Molding Dies (Machine Cut Cavity)	MIRROR FINISH TYPE 420 Oil Hardening		C .30, Mn 1.00 max., Si 1.00 max., Cr 13.00	Oil
Shock Resisting (Intermittent Impact)	HAWK STANDARD Water Hardening	W1	C .90/1.00	Water, Brine
Special Roll Steel (Metal Working Rolls)	HAWK H ROLL STEEL Water Hardening	L7	C .85/1.10, Mn .30/.60, Si .15/.30, Cr 1.00/1.50, V .15/.30	Water, Oil

HAYNES STELLITE CO., division of Union Carbide Corp., 725 South Lindsay, Kokomo, Ind. — Listing No. 30

Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed, Feed, Heavy Cut)	HAYNES STELLITE STAR-J METAL ALLOY (Cast Alloy)		Cr 32, W 17, Co 41, C 2.50, Fe 3, Ni 2.5
Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed and Feed)	HAYNES STELLITE ALLOY NO. 3 (Cast Alloy)		Cr 30, W 12, Co 47, C 2.50
Cutting Tools (Roughing, Finishing) (Withstands Severe Shock)	HAYNES STELLITE ALLOY NO. 19 (Cast Alloy)		Cr 31, W 10, Co 53, C 1.50
Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed)	HAYNES STELLITE 98 M2 ALLOY (Cast Alloy)		Cr 30, W 18, Co 38, C 2.00, Fe 2.2, Ni 3.5
Diecasting Dies	(See HAYNES STELLITE NO. 3, Listed Above)		
Diecasting Dies	HAYNES STELLITE ALLOY NO. 6* (Cast Alloy)		Cr 27, W 4, Co 60, C 1.15
High Stress and High Wear Machinery Parts	(See HAYNES STELLITE ALLOYS NO. 3, 6, 19, 98M2, Star J Metal)		
High Stress and High Wear Machinery Parts	HAYNES STELLITE ALLOY NO. 4		Cr 30, W 14, Fe 3, Co 51, C 0.6
High Stress and High Wear Machinery Parts	HAYNES STELLITE ALLOY NO. 6B		Cr 30, W 4.5, Co 59, C 1.10
High Stress and High Wear Machinery Parts	HAYNES STELLITE ALLOY NO. 6K		Cr 31, W 4.5, Co 58, C 1.60
High Stress and High Wear Machinery Parts	HAYNES STELLITE ALLOY NO. 12*		Cr 31, W 8, Fe 2, Co 55, C 1.45
High Stress and High Wear Machinery Parts	HAYNES ALLOY NO. 90		Cr 27, Fe 68, C 2.75
High Stress and High Wear Machinery Parts	HAYNES ALLOY NO. 93		Cr 17, Fe 53, C 3.0, Mo 16 Co 6
Hot Punching, Hot Shearing (Hard Facing Material)	HASTELLOY ALLOY C* Nickel Base Alloy		Cr 16, W 4, Mo 17, Fe 6, C 1.0 max., Ni Bal
Hot Punching, Hot Shearing (Hard Facing Material)	(See STELLITE ALLOY NO. 6, Listed Above)		
Shock Resisting (Hard Facing Material)	(See HAYNES STELLITE ALLOY NO. 12, Listed Above)		
Shock Resisting	HAYNES ALLOY NO. 25		Cr 20, W 15, Fe 3, Ni 10, Co 19, C 0.09
Shock Resisting	(See HAYNES STELLITE ALLOYS NO. 6, 6B, 6K, 19, Listed Above)		
Shock Resisting (Hard Facing Material)	HASCROME		Cr 12, Mn 4, C 1.0, Fe Bal
Shock Resisting (Hard Facing Material)	(See HAYNES STELLITE ALLOY NO. 12, Listed Above)		

*These alloys are available in castings for the services specified. Hastelloy Alloy C and Haynes Stellite Alloy No. 6 are also recommended for shock resisting service.

HEPPENSTALL CO., 4620 Hatfield St., Pittsburgh 1, Pa. — Listing No. 31

Cold Shearing	EIS R43 Oil, Air Hardening		C 1.55, Mn .25, Cr 11.50, W .75, Mo .75, Si .35	Air, Oil
Cold Shearing	EIS R45 Oil, Air Hardening		C .85, Mn .25, Cr 11.50, Mo .45, Si .35	Air, Oil
Cold Shearing	EIS R97 Oil Hardening		C .58, Mn 1.00, Cr .30, Mo .40, Si 2.15	Oil
Cold Shearing	EIS V2 Water Hardening		C .80, Mn .40, V .10, Si .60	Water
Cold Shearing	EIS V3 Water Hardening		C .95, Mn .40, V .10, Si .60	Water
Cold Work Dies	(See EIS R43, EIS R45, Listed Above)			
Cold Work Dies	2V72 Water Hardening		C .80, Mn .40, V .10, Si .60	Water
Cold Work Dies	2V90 Water Hardening		C .95, Mn .40, V .10, Si .60	Water

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Diecasting Dies (Zinc, Aluminum)	EIS H720 Oil, Air Hardening		C .40, Mn .30, Si 1.00, Cr 5.25, Mo 1.10, V 1.00	Air, Oil
Diecasting Dies (Zinc, Aluminum)	EIS T721 Oil, Air Hardening		C .35, Mn .35, Si 1.00, Cr 5.00, Mo 1.50, W 1.25, V .20	Air, Oil
Diecasting Dies (Lead, Zinc)	MOLDTEM Prehardened		C .35, Mn .75, Si .30, Cr 1.00, Mo .45, V .10	
Hot & Cold Trimming	EIS H41 Oil, Air Hardening		C .95, Mn .30, Cr 4.00, M .25, V .20, Si .25	Air, Oil
Hot & Cold Trimming	EIS T51 Oil Hardening		C .65, Mn .70, Cr .70, W 2.25, Si .30, Ni 1.50	Oil
Hot Shearing	EIS R71S Oil, Air Hardening		C .35, Mn .30, Cr 5.00, Mo 2.00, Si 1.00	Air, Oil
Hot Shearing	EIS T73 Oil, Air Hardening		C .28, Mn .30, Cr 3.50, W 9.00, V .25, Si .45	Air, Oil
Hot Shearing	EIS T77 Oil, Air Hardening		C .33, Mn .30, Cr 4.00, W 12.00, V .25, Si .30	Air, Oil
Hot Work Dies	"C" ANNEAL Oil Hardening		C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	Oil
Hot Work Dies	C55 Oil Hardening		C .55, Mn .50, Cr .90, Mo .30, Si .25, Ni 1.50	Oil
Hot Work Dies	5H50 Oil Hardening		C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	Oil
Hot Work Dies	HARDTEM Prehardened		C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	
Hot Work Dies	SUPER HARDTEM Prehardened		Special Ni-Cr-Mo-V	
Hot Work Dies	PRESNEAL Oil, Air Hardening		Special Precipitation Hardening Alloy Steel	Air, Oil
Hot Work Dies	PRESTEM Prehardened		Special Precipitation Hardening Alloy Steel	
Hot Work Dies	SUPER PYRONEAL Oil, Air Hardened		Special Cr-Mo-Si-Ni	Air, Oil
Hot Work Dies	PYRONEAL Oil, Air Hardening		C .55, Mn .60, Cr 1.00, Mo .75, Si .60, Ni 2.15	Air, Oil
Hot Work Dies	SUPER PYROTEM Prehardened		Special Cr-Mo-Si-Ni	Air, Oil
Hot Work Dies	PYROTEM Prehardened		C .55, Mn .60, Cr 1.00, Mo .75, Si .60, Ni 2.15	
Hot Work Dies	THERMONEAL Oil, Air Hardening		C .35, Mn .30, Si 1.00, Cr 5.00, Mo 2.00	Air, Oil
Hot Work Dies	THERMOTEM Prehardened			
Hot Work Dies	(See EIS T73, EIS T77, EIS T721, EIS R71S, Listed Above)			
Plastic Molding Dies	MOLDTEM Prehardened		C .35, Mn .75, Si .30, Cr 1.00, Mo .45, V .10	

HIDALGO STEEL CO. INC., 74 Varick St., New York, N. Y. — Listing No. 32

Chisels, Punches, Shear Blades	UNICO Water Hardening		Tungsten chromium steel	Water Movement —C Oil Movement —B
Dies	CHROME B Oil Hardening		High chromium	Oil Movement —A
Hand Bull Points, Chisels, Fire Tools	MILO Water Hardening		C .43-.48, Mn 1.00-1.10	Water Movement —C Oil Movement —B
High Speed	COBALT			Oil Movement —B
High Speed	JANO		Cr 3.00, C .80, W 18, V 2.00, Mo .75	Oil Movement —B
Pneumatic Chisels, Punches	ITEGO		C .55, Mn .85, Cr .25, V .30, Si 2.00	Water Movement —C
Punches, Chisels, Shear Blades	COLOSSO No Draw Steel		C .35, Mn .70, Cr .80, Mo .30, Si .45	Water Movement —B
Shear Blades, Chisels	HIDALGO		Cr 1.00, W 1.50-2.00	Water Movement —C Oil Movement —B

HOUGHTON & RICHARDS INC., 19 Jersey St., Boston 15, Mass. — Listing No. 33

Brake Dies	H & R BRAKE DIE		C .50, Mn 1.00, Cr .95, Mo .20	
Carbide Shank Steel	H & H No. S Water, Oil Hardening	S5	C .60, Mn .70, Mo .45, V .20, Si 1.85	Water, Oil Mach. 65 Movement + B
Carbide Shank Steel	H & R No. SM Water, Oil Hardening	S1	C .55, Mn .75, Mo .20, Si 2.00	Water, Oil Mach. 85 Movement + B
Carbide Shank Steel	H & R N150 Oil Hardening	L6	C per temper, Mn .55, Cr .85, Mo .42, Si .30, Ni 1.40	Oil Mach. 75 Movement + A
Cold Heading	H & R HEADING DIE Water Hardening	W1	C .90-1.00, Mn .20, Si .30	Brine Mach. 100 Movement + C
Cold Work Dies (Cold Forming)	H & R No. 135 Water Hardening	L7	C 1.00, Mn .35, Cr 1.45, Si .25	Oil, Water Mach. 90 Movement —A
Cold Work Dies (Blanking, Cold Forming)	H & R GOLD LABEL Water Hardening	F3	C 1.40, Mn .25, W 4.00, Cr .50, Si .20, V .30	Water Mach. 65 Movement —B
Cold Work Dies (Blanking, Cold Forming)	H & R K Oil Hardening	D3	C 2.32, Mn .32, Cr 13.00, V .22, Si .22	Oil Mach. 40 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2 Oil, Air Hardening	D2	C 1.50, Mn .25, Cr 11.50, Mo .75, V .25, Si .30	Oil, Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2L Air, Oil Hardening	D1	C .85, Ni 1.00, Mo .45, Cr 11.50, V .30	Oil, Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-3 Air Hardening	D7A	C 2.40, Si .25, Mn .25, Cr 13.00, V 4.00, Mo 1.00	Air Mach. 40 Movement + A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Cold Forming)	H & R No. 50 Oil Hardening	H26	C .58, Mn .25, Cr 4.10, W 18.00, V 1.13, Si .25	Oil Mach. 55 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R OIL HARDENING Oil Hardening	O2	C .95, Mn .95, Cr .55, Si .20	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming)	H & R TUNGSTEN OIL HARDENING Oil Hardening	O1	C .90, Mn 1.10, Cr .50, W .50, V .20, Si .25	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming)	H & R No. 19 Oil Hardening	O2	C .92, Mn 1.55, Cr .18, Si .32	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 60 Water, Oil Hardening	O7	C 1.20, Mn .25, Cr .70, W 1.90, Mo .25, V .20, Si .30	Water, Oil Mach. 85 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 61 Air Hardening	D5	C 1.35, Mn .25, Cr 12.12, Mo .64, Co 3.04, Si .50	Air Mach. 60 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 80 Air Hardening	A2	C 1.00, Mn .65, Cr 5.25, Mo 1.10, V .25, Si .20	Air Mach. 85 Movement + A
Cutting Tools (Finishing)	H & R No. 44 High Speed	M50	C .80, Mn .30, Cr 4.10, Mo 4.25, V 1.10, Si .25	Oil Mach. 60 Movement + A
Cutting Tools (Finishing)	H & R No. 59 High Speed	M52	C .85, Mn .30, Cr 4.10, Mo 4.25, V 1.82, Si .25	Oil Mach. 55 Movement + A
Cutting Tools (Finishing)	H & R No. 431 High Speed	M54	C 1.18, Mn .30, Cr 4.10, Mo 4.25, V 3.15, Si .25	Oil Mach. 50 Movement + A
Cutting Tools (Finishing)	H & R No. 444 High Speed	M56	C 1.40, Mn .30, Cr 4.10, Mo 4.25, V 4.15, Si .25	Oil Mach. 45 Movement + A
Cutting Tools (Roughing)	H & R SUPER COBALT High Speed	T6	C .80, Mn .20, Cr 4.25, W 20.50, Mo .60, V 1.35, Co 12.25, Si .32	Oil, Air, Salt Bath Mach. Movement + A 40
Cutting Tools (Roughing)	H & R No. 4 High Speed	T5	C .80, Cr 4.50, W 18.50, Mo .80, V 1.75, Co 7.50	Oil, Air, Salt Bath Mach. Movement + A 45
Cutting Tools (Roughing)	H & R No. 48 High Speed	M30	C .81, Mn .30, Cr 4.10, W 1.70, Mo 8.30, V 1.25, Co 5.00, Si .30	Oil Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	H & R COBALT High Speed	T4	C .78, Cr 4.00, W 18.00, V 1.00, Co 5.00	Oil, Air, Salt Bath Mach. Movement + A 50
Cutting Tools (Roughing, Finishing)	H & R COBALT MOLY High Speed	M36	C .88, Mn .25, Cr 4.10, W 6.00, Mo 6.00, V 1.90, Co 9.00, Si .25	Oil Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	H & R MOLYHI High Speed	M1	C per temper, Cr 4.00, W 1.50, Mo 8.50, V 1.15	Oil, Air, Salt Bath Mach. Movement + A 55
Cutting Tools (Roughing, Finishing)	H & R MOLY VAN High Speed	M10	C .82, Cr 4.00, Mo 9.00, V 2.20	Oil, Air, Salt Bath Mach. Movement + A 60
Cutting Tools (Roughing, Finishing)	H & R SUPER MOLYHI High Speed	M30	C .82, Mn .25, Cr 4.00, W 1.50, Mo 8.50, V 1.25, Co 5.00, Si .32	Oil, Air, Salt Bath Mach. Movement + B .50
Cutting Tools (Roughing, Finishing)	H & R No. 1 High Speed	T1	C .70, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .30	Oil, Air, Salt Bath Mach. Movement + A 55
Cutting Tools (Roughing, Finishing)	H & R No. 2 High Speed	T2	C .80, Cr 4.25, W 18.50, Mo .65, V 2.15, Si .35	Oil, Air, Salt Bath Mach. Movement + A 45
Cutting Tools (Roughing, Finishing)	H & R No. 3 High Speed	T3	C 1.04, Mn .26, Cr 4.18, W 18.46, Mo .84, V 3.41, Si .27	Oil, Air, Salt Bath Mach. Movement + A 50
Cutting Tools (Roughing, Finishing)	H & R No. 7 High Speed	M3	C 1.15, Mn .25, Cr 4.00, W 6.00, Mo 6.00, V 3.00, Si .25	Oil Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	H & R No. 7 Type 1	M3	C 1.02, WC .10, Cr 4.00, V 2.40, Mo 6.00	Oil Mach. 70 Movement + A
Cutting Tools (Roughing, Finishing)	H & R No. 57 High Speed	M2	C .80, Mn .25, Cr 4.00, W 6.00, Mo 5.00, V 1.90, Si .25	Oil, Air, Salt Bath Mach. Movement + A 55
Cutting Tools (Roughing, Finishing)	H & R No. 445 High Speed	T15	C 1.50, W 13.50, Cr 4.50, V 4.75, Co 5.00, Mo .50	Oil Mach. 40 Movement + A
Cutting Tools (Also Hot and Cold Work Dies)	H & R No. 45 High Speed	H42	C .65, W 6.50, Cr 4.00, V 2.00, Mo 5.00	Oil Mach. 60 Movement + A
Diecasting Dies	H & R HOT WORK No. 5 (Hot Work Type)	H13	C .35, Mn .35, Cr 5.00, Mo 1.00, Si 1.00, V 1.00	Air Mach. 65 Movement + A
Diecasting Dies	H & R HOT WORK No. 6 (Hot Work Type)	H12	C .35, Mn .35, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	Air Mach. 75 Movement + A
Diecasting Dies	H & R HOT WORK No. 7 (Hot Work Type)	H12	C .55, Mn .30, Cr 5.00, W 1.20, Mo 1.20, Si .95	Air, Oil Mach. 85 Movement + A
Diecasting Dies	H & R No. 55 High Speed	H14	C .35, Mn .25, Cr 5.25, W 5.25, Mo .20, V .20, Co .50, Si .90	Air Mach. 65 Movement + A
Heading Dies	H & R SPECIAL HEADING DIE Water Hardening	W1	C .90-1.00, Mn .20, Si .30	Brine Mach. 100 Movement + C
High Stress, High Wear Machinery Parts	H & R SN		C .55, Si 1.00, Mn .90, Cr .40, Ni 2.70, V .13, Mo .45	Air, Oil Mach. 55 Movement + A
Hot Work Dies (Hot Forming)	H & R No. 550 (Hot Work Type)	H11	C .30, Si .40, W 1.00, Mo 6.25, Cr 3.75, V .75	Oil Mach. 75 Movement + B
Hot Work Dies (Hot Forming)	H & R HOT WORK No. 12 (Hot Work Type)	H23	C .30, Mn .35, Cr 12.00, W 12.00, V .90, Si .50	Air, Oil Mach. 50 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK (Hot Work Type)	H22	C .32, Cr 3.25, W 10.25, V .40, Si .28	Oil, Dry Air Blast Mach. Movement + A 60
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 2 (Hot Work Type)	H21	C .33, Mn .20, Cr 3.50, W 9.25, V .50, Si .30	Oil, Water Mach. 60 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 4 (Hot Work Type)	H7A	C .97, Mn .35, Cr 3.90, Si .35	Air Blast Mach. 80 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 15 (Hot Work Type)	H25	C .25, Mn .20, Cr 4.03, W 15.10, V .51, Si .26	Oil Mach. 65 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	MYA Oil Hardening	HSA	C .42, Mn .30, Cr 1.45, V .25, Si 1.45	Oil Mach. 55 Movement + B
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R No. 225 Oil, Air Hardening	S1	C .50, Mn .25, Cr 1.50, W 2.50, V .25, Mo .50 max	Oil, Air Mach. 80 Movement + A
Hot Work Dies (Hot Punching, Hot Shearing)	H & R No. 555 Hot Work Type	H11	C .50, Si .50, W 1.00, Mo 6.25, Cr 3.75, V .75	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See H & R HOT WORK No. 5, H & R HOT WORK No. 6, H & R No. 55, Listed Above)			
Pistons	H & R PISTON Water Hardening	W5	C 1.14, Mn .32, Cr .58, V .19, Si .21	Water Mach. 80 Movement + C
Plastic Molding Dies (All Types)	MYA	(Listed Above)		

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "−" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Molding Dies	H & R PLASTIC MOLD L		C .50, Mn 1.00, Si .30, Cr 1.10, Mo .25	Prehardened Mach. 80 No Movement
Plastic Molding Dies (Machined Cavity Dies)	H & R MULTIMOLD Oil Hardening	P20	C .35, Mn .70, Si .45, Cr .80, Mo .30	Oil
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD Air Hardening	P4	C .07, Mn .40, Si .25, Cr 4.50, Mo .45	Air Movement +A
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD B Oil Hardening	P5	C .06, Mn .30, Si .15, Cr 1.00, Mo .25, Boron Added	Oil Movement +B
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD C Oil Hardening	P1	C .06, Mn .15, Si .10	Oil Movement +B
Punching and Shearing	H & R CARBON Water Hardening	W1	C .90-1.05 or as specified, Mn .25, Si .20	Water, Brine Mach. 100 Movement +C
Punching and Shearing	H & R Non-Tempering Water, Oil Hardening	S6A	C .35, Mn .70, Cr .80, Mo .30, Si .45, Cu .30	Water, Oil Mach. 80 Movement ±B
Punching and Shearing	H & R SPECIAL CARBON Water Hardening	W1	C .90-1.05 or as specified, Mn .25, Si .20	Water, Brine Mach. 100 Movement +C
Punching and Shearing	H & R VANADIUM Water Hardening	W2	C 1.05-1.15, Mn .25, V .18, Si .20	Water, Brine Mach. 100 Movement +C
Punching and Shearing	(See H & R OIL HARDENING, H & R TUNGSTEN OIL HARDENING, H & R No. 19, H & R No. 60, H & R No. 225, Listed Above)			
Shock Resisting (Intermittent Impact)	H & R No. 15 Oil Hardening	L2	C .45, Mn .55, Cr .95, V .20	Oil Mach. 80 Movement +B
Shock Resisting (Intermittent Impact)	H & R No. 85 Oil Hardening	L2	C .50, Mn .80, Cr .95, V .20, Si .25	Oil Mach. 75 Movement —B
Shock Resisting (Repeated, Intermittent Impact)	(See MYA, H & R No. 60, Listed Above)			
Shock Resisting Tools (Repeated Impact)	H & R CM		C .50, Mn .70, Si .25, Cr 3.25, Mo 1.40	Air Mach. 90 Movement —A
Shock Resisting (Repeated Impact)	H & R SILICO Water, Oil Hardening	S2	C .50, Mn .45, Mo .50, V .20, Si 1.10	Water, Oil Mach. 65 Movement +B

HOYLAND STEEL CO., 405 Lexington Ave., New York 17, N. Y. — Listing No. 34

Cold Work Dies	HSC COLD HEADER DIE STEEL Water Hardening	W1	(Secure special information from manufacturer)	
Cold Work Dies	HSC-CVM Air Hardening	A2	C .95-1.05, Mn .60-.80, Cr 5.00-5.50, Mo .95-1.25, V .20-.30, Si .20-.40	Air
Cold Work Dies	HSC-CW-OIL Oil Hardening	O1	C .85-.95, Mn 1.00-1.20, Cr .40-.60, W .40-.60, Si .25-.45	Oil
Cold Work Dies	HSC SPECIAL Water Hardening	W1	C 1.00-1.20, Mn .25-.35, Si .20-.30	Water
Cold Work Dies	HSC-SS-EXTRA Water Hardening	W1	C 1.00-1.10, Mn .25-.35, Si .25-.35	Water
Cold Work Dies	HSC-350 Water Hardening	F2	C 1.25-1.35, Mn .20-.40, W 3.00-4.00, Si .45	Water
Cold Work Dies (Blanking)	HSC-265 Oil, Air Hardening	D2	C 1.55-1.70, Mn .25-.35, Cr 11.50-12.50, Mo .70-.90, V .15-.25, Si .25-.35	Air, Oil
Cold Work Dies (Blanking)	HSC-265-H	D3	C 2.05, Mn .40, Cr 11.50, V .60	Air, Oil
Cold Work Dies (Stamping & Forming)	HSC-L97		C .55, Cr 1.00, Ni 3.00, Mo .35	Air, Oil
Cold Work Tools	HSC REGULAR Water Hardening	W1	C as specified, Mn .20-.35, Si .25-.35	Water
Cutting Tools (Roughing)	HSC COBALT 5 Oil, Air Hardening	T4	C .68-.75, Mn .10-.30, Cr 3.75-4.25, W 16.75-17.75, Mo .40-.60, V .95-1.15, Co 4.25-4.75, Si .25-.40	Oil, Air
Cutting Tools (Roughing)	HSC 6-6-2 Oil, Air Hardening	M2	C .75-.85, Mn .20-.30, Cr 3.90-4.30, W 5.50-6.00, Mo 4.50-5.50, V 1.40-1.75, Si .20-.40	Oil, Air
Cutting Tools (Roughing)	HSC 18-4-1 Oil, Air Hardening	T1	C .70-.75, Mn .10-.30, Cr 3.75-4.25, W 17.50-18.50, V .95-1.15, Si .25-.40	Oil, Air
Cutting Tools (Finishing)	(See HSC SPECIAL, HSC-SS-EXTRA, HSC-350, Listed Above)			
Diecasting Dies	HSC-33-HV	H13	C .40, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air
Hot Work Dies	HSC-33 Air Hardening	H12	C .30-.35, Mn .30-.40, Cr 4.50-5.00, W 1.00-1.20, Mo 1.40-1.60, Si .80-1.00	Air
Hot Work Dies	HSC-310 Oil, Air Hardening	H21	C .28-.33, Mn .20-.30, Cr 3.00-3.50, W 9.50-10.50, V .25-.50, Si .20-.40	Oil, Air
Hot Work Dies	HSC-313 Oil, Air Hardening	H25	C .35-.40, Mn .20-.35, Cr 2.75-3.25, W 13.00-14.00, Si .20-.40	Oil, Air
Hot Work Dies	HSC-515 Air Hardening		C .35-.40, Mn .20-.35, Cr 4.80-5.30, W 4.80-5.30, Mo .15-.30, Si .80-1.10	Air
Hot Work Dies	HSC-33	(Listed Above)		
Plastic Molding Dies	LUSTRE-DIE Pre-Hardened		C .50, Mn 1.00, Si .30, Cr 1.10, Mo .25	Oil
Plastic Molding Dies	REMA Water Hardening		C .05-.07, Mn .15-.20	
Plastic Molding Dies	REMA B		C .07, Mn .30, Si .15, Cr 1.00, Mo .25	Oil
Shock Resisting (Repeated Impact)	HSC 280 Water Hardening	S5	C .50-.55, Mn .60-.80, Mo .30-.40, Si 1.30-1.60	Water
Shock Resisting (Repeated Impact)	HSC 422 Water, Oil Hardening	S1	C .45-.50, Mn .20-.50, Cr .85-1.05, W .90-1.20, Mo .15-.25, Si .15-.30	Water, Oil

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

JAMISON STEEL CORP., 2168 E. Olympic Blvd., Los Angeles 21, Calif. — Listing No. 35

Cold Work Dies (Blanking, Cold Forming)	AIRTREAT Air Hardening	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .20, Si .25	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	DENSITE Air Hardening	C 1.50, Mn .30, Cr 12.00, Mo .85, V .85, Si .40	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	JAMISON SPECIAL Water Hardening	C 1.00, Mn .25, Cr .16, V .05, Si .25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	K-46 Oil Hardening Nondeforming	C .90, Mn 1.15, Cr .50, W .50, V .10, Si .25	Oil Movement A
Cold Work Dies	MOLY-TUNGSTEN HIGH SPEED STEEL	C .82, Mn .25, Cr 4.15, W 6.20, Mo 5.00, V 1.90, Si .25	Oil, Air Movement A
Cold Work Dies	18-4-1 HIGH SPEED STEEL	C .72, Mn .25, Cr 4.10, W 18.20, V 1.15, Si .30	Oil, Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear)	DIECAST #1 Air Hardening, Heat Resistant	C .37, Cr 5.25, Mo 1.35, V .50	Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear, Shock Resistant)	HICKORY Oil Hardening, Shock Resistant	C .50, Si .90, Mn .25, Cr 1.05, W 2.45	Oil Movement B

JESSOP STEEL CO., 500 Green St., Washington, Pa. — Listing No. 36

Cold Heading	NEW PROCESS COLD HEADER....W1 Water Hardening	C 1.00, Mn .25, Si .18	Water Mach. 100 Movement B
Cold Heading	TRU-HEDER DIE	C 1.40, Mn .40, Cr .50, V 3.50	Water Mach. 75 Movement B
Cold Work (Dies, Rolls, etc.)	B X 3	C 2.20, Mn .40, Cr 4.00, V 4.00	Air Mach. 75 Movement A
Cold Heading	NEW PROCESS COLD HEADER ...W1 Water Hardening	C 1.00, Mn .25, Si .18	Water Mach. 100 Movement B
Cold Work (Dies, Rolls, etc.)	3-C CAST-TO-SHAPE	C 1.55, Cr 13.00, Ni .15, Mo 1.15, V .55, Co .70	Air Mach. 60 Movement A
Cold Work (Dies, Rolls, etc.)	3-C EXTRA-CAST-TO-SHAPE	C 1.55, Cr 13.00, Ni .40, Mo 1.15, Co 1.10	Air Mach. 60 Movement A
Cold Work (Dies, Rolls, etc.)	3-C SPECIAL-CAST-TO-SHAPE D5	C 1.55, Cr 13.00, Ni .40, Mo 1.15, V .50, Co 3.25	Air Mach. 60 Movement A
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-1 Air Hardening D2	C 1.50, Mn .30, Cr 12.00, Mo .75, V .80, Si .40	Air Mach. 75 Movement B
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-2 Oil Hardening D3	C 2.25, Mn .42, Cr 12.00, V .20, Si .45	Oil Mach. 75 Movement B
Cold Work Dies	DICA (Flame Hard.) CAST-TO-SHAPE..	C .42, Mn .75, Si .25, Cr 1.00, Mo .20	Oil Mach. 85 Movement B
Cold Work Dies	LION EXTRA Water Hardening W1	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cold Work Dies	LION Water Hardening W1	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cold Work Dies	SPECIAL OIL HARDENING ....O2 Oil Hardening	C .90, Mn 1.75, Cr .20, Si .35	Oil Mach. 100 Movement A
Cold Work Dies	TRUFORM-CAST-TO-SHAPE O1	C 1.00, Mn 1.15, Si .35, Cr .50, W .50	Oil Mach. 90 Movement B
Cold Work Dies	TRUFORM Oil Hardening O1	C .90, Mn 1.20, Cr .50, W .50, Si .30, V .20	Oil Mach. 90 Movement A
Cold Work (Dies, Rolls, etc.)	TRU WEAR D7	C 2.20, Mn .40, Cr 12.00, V 4.00	Air Mach. 60 Movement + A
Cold Work (Lamination Dies)	(See, B X 3 and TRU WEAR, Listed Above)		
Cold Work Dies	WASHINGTON Water Hardening W1	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cold Work Dies (Lamination Dies, etc.)	WINDSOR Air Hardening A2	C 1.00, Mn .50, Cr 5.00, Mo 1.25, V .30, Si .25	Air Mach. 75 Movement B
Cold Work Dies	WINDSOR—CAST-TO-SHAPE A2	C 1.00, Mn .35, Cr 5.25, Mo 1.00, V .25	Air Mach. 75 Movement A
Cold Work Dies & Cams	3312 CAST-TO-SHAPE	C .12, Mn .45, Si .28, Ni 3.40, Cr 1.40	Oil Mach. 85 Movement B
Cutting Tools	M-3 High Speed M3	C 1.03, Mn .30, Cr 4.00, W 6.00, V 2.50, Mo 5.50	Air, Oil Mach. 60 Movement B
Cutting Tools	M-10 High Speed M10	C .86, Mn .30, Cr 4.00, V 2.00, Mo 8.50	Air, Oil Mach. 60 Movement B
Cutting Tools	T-[illegible] High Speed ....T[illegible]	C .79, Mn .30, Cr 4.00, W 14.00, V 2.00, Mo .75, Co 5.00	Air, Oil Mach. 60 Movement B
Cutting Tools	MOGUL High Speed M1	C .78, Mn .25, Cr 3.80, W 1.50, Mo 8.70, V 1.15, Si .30	Oil Mach. 60 Movement B
Cutting Tools	MUSTANG High Speed M2	C .84, Mn .25, Cr 4.20, W 6.35, Mo 5.00, V 1.95, Si .25	Oil Mach. 60 Movement B
Cutting Tools	PURPLE LABEL High Speed T4	C .74, Mn .28, Cr 4.20, W 18.50, Mo .50 max., V 1.10, Co 5.00	Oil Mach. 60 Movement B
Cutting Tools	PURPLE LABEL EXTRA High Speed T5	C .78, Mn .28, Cr 4.20, W 18.50, Mo .75, V 1.95, Co 7.90	Oil Mach. 60 Movement B
Cutting Tools	KING COBALT High Speed T6	C .78, Mn .30, Cr 4.20, W 19.50, Mo .75, V 1.75, Co 11.50	Oil Mach. 60 Movement B
Cutting Tools	SUPREMUS High Speed T1	C .73, Mn .28, Cr 4.00, W 18.00, V 1.10	Oil Mach. 60 Movement B
Cutting Tools	SUPREMUS EXTRA High Speed T2	C .85, Mn .30, Cr 4.00, W 18.50, Mo .75, V 2.10	Oil Mach. 60 Movement B
Cutting Tools	RAPID FINISHING Water Hardening	C 1.35, Mn .35, Cr .75, W 3.75	Water Mach. 85 Movement B
Cutting Tools	(See C.N.S.-1, C.N.S.-2, TRUFORM, WINDSOR, Listed Above)		
Cutting Tools (Roughing, Finishing)	(See LION, LION EXTRA, WASHINGTON, RAPID FINISHING, Listed Above)		

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Diecasting Dies	DICA B Air Hardening	H12	C .35, Mn .35, Cr 5.00, W 1.15, Mo 1.50, V .20, Si 1.00	Air Mach. 75 Movement B
Diecasting Dies	3-C SPECIAL Air Hardening	D5	C 1.55, Mn .30, Cr 13.00, Mo 1.15, Co 3.25, Ni .40, V .50	Air Mach. 75 Movement B
Gages	(See TRUFORM, SPECIAL OIL HARDENING, Listed Above)			
Hot Work Dies	DICA B—MOD. CAST-TO-SHAPE	H11	C .35, Mn .40, Si .95, Cr 4.85, V .35, Mo 1.40	Air Mach. 75 Movement B
Hot Work Tools & Dies	DICA B—MODIFIED	H11	C .36, Mn .35, Cr 4.85, V .20, Mo 1.50	Air Mach. 75 Movement B
Hot Work Tools & Dies	DICA B—VANADIUM	H13	C .36, Mn .35, Cr 4.85, V 1.00, Mo 1.50	Air Mach. 75 Movement B
Hot Work Tools & Dies	J HOT WORK Air Hardening		C .62, Mn .30, Si .35, Cr 3.80, Mo .55, V .55	Air Mach. 75 Movement B
Hot Work Tools & Dies	JJ HOT WORK Air Hardening		C .92, Mn .30, Si .35, Cr 3.80, Mo .55, V .55	Air Mach. 75 Movement B
Hot Work Tools & Dies	2B-LC Oil Hardening	H21	C .30, Mn .30, Si .30, Cr 3.00, W 10.00, V .30	Oil, Air Mach. 75 Movement B
Shear Blades, Chisels, Dies, Forming Tools, Punches	RTS Water Hardening	S2	C .55, Mn .50, Mo .45, Si .80	Water, Oil Mach. 90 Movement B
Shock Resisting Tools, Chisels	MAGIC Oil Hardening		C .52, Mn .90, Mo 1.00, Si 2.00	Water, Oil Mach. 75 Movement B
Shock Resisting Tools, Chisels	No. 259	S5	C .52, Mn .95, Si 2.00, Mo .50, V .20, Cr .15	Water, Oil Mach. 75 Movement B
Shock Resisting Tools, Shear Blades (Pneumatic Tools)	TOP NOTCH Oil Hardening	S1	C .50, Mn .30, Cr 1.15, W 2.40, V .20	Oil Mach. 80 Movement B
Tools & Dies (Shallow Hardening)	(See NEW PROCESS COLD HEADER, WASHINGTON, Listed Above)			

KENNAMETAL INC., Latrobe, Pa.

Listing No. 37

- Cutting Tools (Heavy rough turning, forged, rolled steel) — KM, Carbide
- Cutting Tools (Moderate finishing cuts, steel) — K3H, Carbide
- Cutting Tools (Heavy roughing, cast steel, scaly, sandy cast iron) — K2S, Carbide
- Cutting Tools (General machining of steel) — K21, Carbide
- Cutting Tools (Abrasive cuts on steel, large nose radius, or tools that dwell) — K4H, Carbide
- Cutting Tools (Hard steels, precision boring) — K5H, Carbide
- Cutting Tools (High velocity cutting, steel, inserts only) — K7H, Carbide
- Cutting Tools (Heavy roughing or planing of cast iron) — K1, Carbide
- Cutting Tools (General machining, cast iron, nonmetallics) — K6, Carbide
- Cutting Tools (Fine finishing, precision boring of cast iron and nonferrous materials) — K8, Carbide
- Cutting Tools (Fine finishing cuts on nonferrous and plastics) — K11, Carbide
- Deflection Resistant Machine Elements (Grinding quills, boring bars and machine elements requiring a high modulus of elasticity) — K95, K96, Carbide
- Dies, Cold Draw, Nongalling, H.D. (Sizing mandrels H.D. Burnishing Rolls) — K82, Carbide
- Dies, Cold Draw, Nongalling (Bar, Tube, Sizing Mandrels, Wire Flattening Rolls) — K84, Carbide
- Dies, Cold Draw, Nongalling (Wire, Rod, Tube, Burnishing, Flaring) — K86, Carbide
- Dies, Cold Work, Heavy Shock (Blanking—3/16-in. Steel, Cold Heading, Nibbling, Swaging) — K90, Carbide
- Dies, Cold Work, Medium to Heavy Shock (Blanking to 1/16-in. Steel, Crushing Hammers, Rivet Sets) — K91, Carbide
- Dies, Cold Work, Medium Shock; Lamination (Blanking to 0.040 in. Steel, Heavy Forming Dies, Heading Hammers) — K92, Carbide
- Dies, Cold Work, Light Shock (Blanking Light to Medium, Slitter Knives, Can Stock, Curling Rolls, Cold Draw) — K94, Carbide
- Dies, Wear Resistant Light Shock (Light Blanking, Light Heading Hammers) — K95, Carbide
- Dies, Wear Resistant, No Shock (Compacting, Blanking, Paper Slitting) — K96, Carbide
- Heat Resistant Applications (Available in compositions for: Hot Machining, Flash Trimming, Hot Spinning, Hot Die Applications) — KENTANIUM
- Rock Cutting Tools — K12, Carbide
- Wear Resistant Parts (Adaptable to long slender extruded shapes) — KE7, Carbide

KLOSTER STEEL CORP., 224-228 N. Justine St., Chicago 7, Ill.

Listing No. 38

Cold Work Dies	PURE-ORE AIR-CHROM Air Hardening	A2	C 1.00, Mn .57, Cr 5.30, Mo 1.0, V .26, Si .23	Air
Cold Work Dies	PURE-ORE EXTRA Water Hardening	W1	Carbon as desired	Water
Cold Work Dies	PURE-ORE SPECIAL Water Hardening	W1	Carbon as desired	Water
Cold Work Dies	PURE-ORE STANDARD Water Hardening	W1	Carbon as desired	Water
Cold Work Dies	PURE-ORE No. 14		C 1.00, Mn .35, Cr .45, Si .23	Water
Cold Work Dies	PURE-ORE No. 25		C 1.20, Mn .35, Cr .60-.80, W 1.30, V .15-.25, Si .30	Water
Cold Work Dies (Blanking, Forming)	PURE-ORE HI-RUN Hi-Chrome, Hi-Carbon	D2	C 1.50-1.60, Mn .35, Cr 11.50-12.50, Mo .75-.90, V .25-.35, Si .40-.50	Air
Cold Work Dies	KLOSTER SWED-OIL Oil Hardening	O1	C .95-1.00, Mn 1.10-1.20, Cr .45-.50, W .45-.50, V .20, Si .25-.35	Oil
Cutting Tools	PURE-ORE CLIPPER High Speed	T1	C .55-.75, Mn .15-.35, Cr 3.80-4.25, W 17.75-18.50, V .90-1.25, Si .20-.35	Oil
Hot Work Dies	PURE-ORE D-C-33 Hot Work	H12	C .33, Mn .20-.40, Cr 4.50-5.50, W 1.35-1.75, Mo 1.45-1.85, Si .85-1.25	Air
Hot Work Dies	PURE-ORE "D-C-33-VA"	H13	C .38, Si 1.00, Mo 1.25, Cr 5.25, V 1.05	Air
Hot Work Dies	PURE-ORE D-C-66 Hot Work	H21	C .30, Mn .31-.43, Cr 3.50, W 8.50-9.00, V .27, Si .29-.36	Air
Hot Work Dies	PURE-ORE KLS-44 Hot Work		C .57, Mn .51, Cr 1.01, Mo .92, Si .28, Ni 1.43	Oil, Air
Shock Resisting	CHIZ-ALLOY	S1	C .45, Mn .30, Cr 1.00-1.25, W 2.50, Si .90, V .20-.25	Oil
Shock Resisting	PURE-ORE SUPER ALLOY	S1	C .45-.50, Mn .35, Cr 1.25, W 2.25-2.50, V .20-.25, Si .90-1.00	Oil

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
LATROBE STEEL CO., Latrobe, Pa.				**Listing No. 39**
Cold Work Dies (Blanking, Cold Forming)	BADGER Oil Hardening	O1	C .94, Si .30, Mn 1.20, W .50, Cr .50	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming)	BR-2 FM Air Hardening		C 2.50, Si .30, Mn .75, Cr 5.25, Mo 1.10, V 4.50	Air Mach. 60 Movement + A
Cold Work Dies (Blanking, Cold Forming)	BR-4 FM Air Hardening	D7	C 2.30, Si .40, Mn .40, Cr 12.50, V 4.00, Mo 1.10	Air Mach. 65 Movement + A
Cold Work Dies (Blanking, Cold Forming)	CARBON, SPECIAL, EXTRA AND STANDARD Water Hardening	W1	C 1.05, Si .20, Mn .20, S .015, P .015, Cr .08	Water Mach. 100 Movement —B
Cold Work Dies (Blanking, Cold Forming)	COBALT CHROME FM Air Hardening	D5	C 1.50, Si .50, Mn .25, Cr 12.25, Mo .5, Co 3.10	Air Mach. 80 Movement + A
Cold Work Dies (Blanking, Cold Forming)	GSN FM Oil Hardening	D3	C 2.10, Si .50, Mn .50, Cr 13.00	Oil Mach. 75 Movement + A
Cold Work Dies (Blanking, Cold Forming)	MGR Air Hardening		C .55, Si .95, Mn .30, W 1.20, Cr 5.00, Mo 1.20	Air Mach. 85 Movement + A
Cold Work Dies (Blanking, Cold Forming)	OLYMPIC FM Air Hardening	D2	C 1.50, Si .30, Mn .30, Cr 12.00, V 1.00, Mo .75	Air Mach. 80 Movement + A
Cold Work Dies (Blanking, Cold Forming)	SELECT B FM Air Hardening	A2	C 1.00, Si .30, Mn .70, Cr 5.25, V .25, Mo 1.10	Air Mach. 90 Movement + A
Cold Work Dies (Cold Forming)	HEDERVAN Water Hardening		C 1.40, Si .35, Mn .40, V 3.50, Cr .15 max., Mo .10 max.	Water Mach. 80 Movement + C
Cutting Tools (Roughing, Finishing)	ELECTRITE CORSAIR XL Oil Hardening, High Speed	M3	C 1.02, W 6.10, Cr 4.00, V 2.40, Mo 6.00	Oil Mach. 70 Movement + A
Cutting Tools (Roughing, Finishing)	ELECTRITE CRUSADER XL Oil Hardening, High Speed	M3	C 1.20, W 6.00, Cr 4.10, V 3.20, Mo 6.00	Oil Mach. 70 Movement + A
Cutting Tools (Roughing, Finishing)	ELECTRITE DOUBLE SIX M-2 XL Oil Hardening, High Speed	M2	C .85, W 6.30, Cr 4.15, V 1.85, Mo 5.05	Oil Mach. 75 Movement + A
Cutting Tools (Roughing, Finishing)	ELECTRITE DYNAVAN XL Oil Hardening, High Speed	T15	C 1.50, W 13.50, Cr 4.50, V 4.75, Co 5.00, Mo .50	Oil Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	ELECTRITE SUPER COBALT Oil Hardening, High Speed	T5	C .85, W 18.75, Cr 4.10, V 2.15, Mo .80, Co 9.00	Oil Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	ELECTRITE TATMO XL Oil Hardening, High Speed	M1	C .80, Si .30, Mn .25, Cr 4.00, W 1.50, Mo 8.50, V 1.00	Oil Mach. 80 Movement + A
Cutting Tools (Roughing, Finishing)	ELECTRITE TNW XL Oil Hardening, High Speed	M10	C .87, Si .25, Mn .25, Cr 4.00, Mo 8.00, V 1.90	Oil Mach. 75 Movement + A
Cutting Tools (Roughing, Finishing)	ELECTRITE NO. 1 XL Oil Hardening, High Speed	T1	C .75, W 18.00, Cr 4.10, Mo .70, V 1.10	Oil Mach. 75 Movement + A
Diecasting Dies (Aluminum, Zinc, Magnesium)	VISCOUNT 20 Free Machining VDC type Air Hardening	H13	C .40, Si 1.00, Mn .30, Cr 5.00, Mo 1.20, V 1.00, plus alloy sulfides	Air Mach. 100 Movement + A
Diecasting Dies (Aluminum, Zinc, Magnesium)	VISCOUNT 44 PREHARDENED	H13	C .40, Si 1.00, Mn .30, Cr 5.00, Mo 1.20, V 1.00, plus alloy sulfides	Prehardened Mach. 70
Diecasting Dies (Zinc)	CASCADE Prehardened		C .20, Si .30, Mn .30, Cr .25, Ni 4.10, V .20, Al 1.20	Prehardened Mach. 80 No Movement
Diecasting Dies (Aluminum, Zinc, Magnesium)	VDC Air Hardening	H13	C .40, Si 1.00, Mn .30, Cr 5.00, Mo 1.20, V 1.00	Air Mach. 80 Movement + A
Gages	(See OLYMPIC FM, SELECT B FM, BADGER, Listed Above)			
High-Stress and High-Wear Machinery Parts	STAMINAL Air Hardening		C .55, Si 1.00, Mn .90, Cr .40, Ni 2.70, V .13, Mo .45	Air, Oil Mach. 55 Movement + A
Hot Work Dies (Forming, Punching and Shearing)	(See VDC, Listed Above)			
Hot Work Dies (Forming, Punching and Shearing)	CLW Oil Hardening	H21	C .30, Si .45, Mn .25, W 9.15, Cr 3.30, V .50	Oil Mach. 70 Movement + B
Hot Work Dies (Forming, Punching and Shearing)	LPD Air Hardening	H12	C .35, Si 1.00, Mn .30, Cr 5.00, Mo 1.60, W 1.30, V .30	Air Mach. 80 Movement + A
Hot Work Dies (Forming, Punching, Shearing, Extrusion)	(See VISCOUNT 20, VISCOUNT 44, VDC and LPD, Listed Above)			
Plastic Molding Dies (Machine Cut Cavity Dies)	(See CASCADE, Listed Above)			
Punching and Shearing	(See OLYMPIC FM, COBALT CHROME FM, SELECT B FM, MGR, BADGER, STAMINAL, Listed Above)			
Shock Resisting (Repeated, Intermittent Impact)	(See STAMINAL, Listed Above)			
Thermostat Parts	INVAR		C .13, Mn .80, Si .25, Ni 38.00	Mach. 40 Movement O
Wear Parts	(See BR-4 FM, Listed Above)			
Plastic Molding Master Hobs	(See MGR & STAMINAL, Listed Above)			
LEHIGH STEEL CORP., Bethune & Greenwich Streets, New York 14, N. Y.				**Listing No. 40**
Blacksmith Tools & Chisels	UTILITY Water Hardening	W1	C .75/1.10	Water Movement C
Cold Work Dies	N-C ALLOY Oil Hardening	L6	C .75, Mn .45, Cr 1.00, Ni 1.65, Si .25	Oil Mach. 80 Movement A
Cold Work Dies	TORPEDO Oil Hardening	O1	C .90/1.05, Mn 1.20, Cr .50, V .20, W .50	Oil Mach. 85 Movement A
Cold Work Dies (Blanking, Cold Forming)	HYCO-1 Oil Hardening	D2	C 1.50, Mn .35, Cr 12.00, Mo .80, V .90, Si .30	Oil Mach. 60 Movement A
Cold Work Dies (Blanking, Cold Forming)	HYCO-2 Air, Oil Hardening	D3	C 2.25, Cr 11.50, Mo .80, V .20, Si .30	Air, Oil Mach. 40 Movement A
Cutting Tools (Roughing)	LEHIGH SS High Speed	T6	C .70, Cr 4.50, Mo .75, Co 11.50, Mn .25, W 18.00, V 1.50, Si .25	Oil Movement B
Cutting Tools (Finishing & Roughing)	LEHIGH XXX High Speed	T2	C .80, Cr 4.25, W 18.00, V 2.00	Oil Movement B

★ Last column indicates suggested Quenching Medium: Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Dies & Blanking (Cold Work)	AIRTEM Air Hardening	A2	C 1.00, Mn .60, Cr 5.50, Mo 1.10, V .20	Air Mach. 70 Movement A
Dies & Tools	CONQUEROR Water Hardening	W1	C .75/1.10, Mn .25, Si .30	Water Mach. 100 Movement C
Hot Work Dies	FERNO Oil Hardening	H12	C .37, Cr 5.00, W 1.25, Mo 1.30, V .40, Si 1.00, Mn .35	Oil Mach. 85 Movement A
Hot Work (High Temperature)	VOLCANO Air Hardening	H12	C .40, Cr 2.00, W 12.00, V .35, S .30	Air Mach. 65 Movement A
Hollow Die Steel	LESCALLOY Oil Hardening		Special Analysis	
Machine Parts	CROMA ALLOY Water & Oil Hardening		Special Analysis	Water or Oil Mach. 90 Movement B
Punches & Dies	APEX DRILL RODS Water Hardening	C1	C 1.00	Water Mach. 100 Movement B
Shearing & Punching	ROCKET Water or Oil Hardening	S5	C .60, Mn .75, Si 1.85, Mo .50	Oil or Water Mach. 70 Movement B
Shock Resisting	LECO NONTEMPERING		Special Analysis	Water Mach. 80 Movement C
Wear Resisting	ABRASEX—Bars & Plates Water & Oil Hardening		Special Analysis	Water or Oil Mach. 90 Movement B

P. F. McDONALD & CO., 17 King Terminal, Boston 27, Mass. — Listing No. 41

Blacksmithing Tools	MACCO SOLID	W1	C .75-.85, Mn .15-.35, Si .15-.30	Water, Oil Movement ±B
Cold Work Dies (Blanking, Forming)	MACCO EXTRA	W1	C .95-1.10, Mn .15-.35, Si .10-.35	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	MACCO STANDARD	W1	C .95-1.10, Mn .15-.35, Si .10-.35	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Punching, Cold Forming)	MACCO KROMAX 1 Air Hardening	D2	C 1.50, Mn .35, Cr 11.90, Mo .90, V .28, Si .23	Air, Oil Mach. 60 Movement +A
Cold Work Dies (Blanking, Punching, Cold Forming)	MACCO KROMAX 2 Air Hardening	D5	C 1.40, Mn .32, Cr 12.50, Mo .85, Co 3.25, Si .42	Air Mach. 60 Movement +A
Cold Work Dies (Cold Heading)	MACCO B-29 Water Hardening	W2	C .98, Mn .26, V .20, Si .20	Water Mach. 100 Movement —B
Cold Work Punches, Dies (all kinds)	MACCO 35 AIR HARD	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.15, V .25, Si .25	Air Mach. 70 Movement +A
Cold Work Punches, Dies (all kinds)	MACCO ROYAL CROWN Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, V .25, Si .30	Oil Mach. 90 Movement +B
Cold Work Punches, Dies (all kinds)	MACCO SPECIAL Water Hardening	W1	C 1.01, Mn .20, Si .16	Water Mach. 100 Movement +C
Cutting Tools	MACCO ENORMOUS High Speed	T6	C .83, Mn .25, Cr 4.50, W 22.00, Mo 1.00, V 2.00, Co 10.00, Si .27	Oil Mach. 55 Movement ±A
Cutting Tools	MACCO RADIO High Speed	M2	C .84, Mn .25, Cr 4.00, W 6.50, Mo 5.00, V 1.90, Si .26	Oil Mach. 65 Movement ±A
Cutting Tools	MACCO SUPERIOR High Speed	T1	C .75, Mn .28, Cr 4.00, W 18.00, V 1.00, Si .22	Oil Mach. 60 Movement ±A
Cutting Tools	MACCO SUPER MOLY High Speed	M1	C .80, Mn .25, Cr 3.90, W 1.70, Mo 8.80, V 1.10, Si .24	Oil Mach. 55 Movement +A
Cutting Tools (Rough Drilling)	HOLLOW DRILL	W1	C .75-.85, Mn .15-.35, Si .15-.30	Water, Oil Movement ±B
Cutting Tools (Stone Drilling)	MACCO BROACHING AND CHANNELLER	W1	C .75-.85, Mn .15-.35, Si .15-.30	Water Movement +C
Diecasting Lens Molds	MACCO LENS MOLD High Speed		C .40, Mn .25, Cr 5.25, W 4.65, Si 1.00	Air, Oil Mach. 70 Movement +A
Diecasting (Magnesium, Aluminum)	MACCO 33 Air Hardening		C .40 Mn .30, Cr 5.50, Mo 1.40, V 1.00, Si 1.00	Air Mach. 70 Movement +A
Diecasting (Zinc)	MACCO 99 Oil Hardening		C .35, Mn .80, Cr .85, Mo .35, Si .60	Oil Mach. 70 Movement +A
Hot Work Dies	MACCO M L Air Hardening	H12	C .35, Mn .30, Cr 5.00, W 1.50, Mo 1.65, Si 1.00	Air Mach. 70 Movement +A
Hot Work Dies	MACCO M.L.V.	H12	C .35, Mn 1.05, Si 1.05, Cr 5.15, Mo 1.55, W 1.25, V .30	Air Mach. 70 Movement +A
Hot Work Dies	MACCO P-125 High Speed	H25	C .25, Mn .28, Cr 4.20, W 15.50, V .50, Si .27	Oil Mach. 65 Movement +A
Hot Work Dies	MACCO P-150 High Speed	H24	C .51, Mn .29, Cr 2.90, W 15.30, V .60, Si .25	Oil Mach. 65 Movement +A
Hot Work Dies	MACCO P-175 High Speed	H21	C .31, Mn .29, Cr 3.30, W 9.50, V .50, Si .43	Oil Mach. 65 Movement +A
Impact Tools, Chisels, Shear Blades	MACCO FOOLPROOF	S1	C .55, Mn .25, Cr 1.40, W 2.40, V .30, Si .25	Oil Mach. 65 Movement ±B
Plastic Molding Dies	MACCO HOBOMOLD "A"	P4	C .07, Mn .40, Si .25, Cr 4.50, Mo .45	Air Mach. 60 Movement +A
Plastic Molding Dies	MACCO HOBOMOLD "B"	P5	C .06, Mn .30, Si .20, Cr 2.00	Oil Mach. 50 Movement +B
Plastic Molding Dies (Hubs)	MACCO HARD TUF Oil Hardening	S5	C .60, Mn .70, Mo .45, V .25, Si 1.85	Oil Mach. 75 Movement +B
Plastic Molding Dies (Hubs)	MACCO HOBOMOLD "C" Water, Oil Hardening	P1	C .04, Mn .20, Si .16	Oil, Water Mach. 40 Movement +C
Press Brake Dies	MACCO BRAKEDIE		C .50, Mn .85, Si .25, Cr .95, Mo .20	Oil Mach. 100 Movement +B
Punching, Shearing	MACCO FOOLPROOF Oil Hardening	S1	C .55, Mn .25, Cr 1.40, W 2.40, V .30, Si .25	Oil Mach. 65 Movement ±B
Shock Resisting (Intermittent Impact, Chisels)	MACCO SIL. MANG. Oil Hardening	S4	C .63, Mn .78, Si 2.00	Oil Mach. 75 Movement B
Special Purpose (Shock Resisting)	MACCO NON. TEMP.		C .35, Mn .70, Si .45, Cr .80, Mo .30, Cu .30	Water, Oil Mach. 80 Movement +B
Special Purpose (Cutting Tools)	MACCO W.J.F.		C 1.40, Mn .25, Si .15, W 4.00, Cr .60, V .35	Water Mach. 70 Movement +C

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

McINNES STEEL CO., 441 E. Main St., Corry, Pa. — Listing No. 42

Brake Dies	McINNES FOLDER-DIE		(Special steel "Brake Die," furnished heat treated ready for use)	

MARSHALL STEEL CO., 4740 S. Lawndale Ave. and Route 66, Lyons, Ill. — Listing No. 43

Cold Work Dies	AIRCRAT	A2	C 1.00, Mn .50, Cr 5.00, Mo 1.00, V .25, Si .25	Air Mach. 65 Movement A
Cold Work Dies	OILCRAT	O1	C .95, Mn 1.20, W .50, Cr .50, Si .25, V .20	Oil Mach. 85 Movement + A
Cold Work Dies	WATERCRAT	W1	C 1.05, Mn .35, Si .20, Cr .50	Water Mach. 100 Movement —B

MERIDIAN STEEL CO., 1776 Broadway, New York 19, N. Y. — Listing No. 44

Cold Work Dies (Blanking)	MERIDIAN AIR DIE Air Hardening		C 1.00, Mn .75, Cr 4.90, Mo 1.15, V .25, Si .30	Air Mach. 100 Movement A
Cold Work Dies (Blanking)	MERIDIAN OIL DIE Oil Hardening		C .95, Mn 1.10, Cr .50, W .60, V .20, Si .30	Oil Mach. 90 Movement A
Cold Work Dies (Shock Resisting)	MER-TEN		C .40, Mn .85, Si .35, Cr 1.00, Ni 1.00, Mo .45	Oil Mach. 70 Movement C
Cutting Tools	MERIDIAN CARBIDE		C .70, Mn .25, Cr 4.50, W 18.50, Mo .70, V 1.50, Co 12.00, Si .25	Oil Mach. 90 Movement B
High Wear Machine Parts, Special Liners (Shock Resistant)	MERIDIAN N.C. Oil Hardening		C .30, Ni 3.50, Cr 2.00	Oil Mach. 45 Movement B
Hot Work Dies	MERIDIAN H DIE Oil or Air Hardening		C .50, Mn .25, Cr 3.00, W 15.00, V .50, S .25	Oil or Air Mach. 90 Movement B
Punching & Shearing	MERICO #2		C .40, Mn .45, Si .70, Cr .75, Mo .55, Cu .65	Oil Mach. 65 Movement C
Shock Resisting	MERICO #1		C .35, Mn .40, Si .75, Cr .70, Mo .65, Cu .70	Water Mach. 60 Movement C
Shock Resisting Tools, Stone Work Chisels, Pneumatic Tools (Repeated Impact)	MERCALLOY Oil Hardening		C .50, Mn .60, Mo .40, W .50, Si 1.35	Oil Mach. 65 Movement B
Special Tubing, Die Steel	MERIDIAN ALLOY Oil Hardening		C 1.10, Cr 1.50, Mn .45, Mo .30, Si .35	Oil Mach. 85 Movement A
Stripper Plates, Shear Blades, Wear Resistant Applications, Liners	MERIDIAN A.R. Oil Hardening		C .45, Si .60, Cr .60, Mo .20, Zr .15, Mn 1.00	Oil Mach. 60 Movement B

METAL CARBIDES CORP., 8001 Southern Blvd., Youngstown 12, Ohio — Listing No. 45

Cold Work Dies (Blanking)	TALIDE C-75, Carbide	W 65.72, Ta 4.69, C 4.59, Co 25.0
Cold Work Dies (Cold Forming)	TALIDE C-88, Carbide	W 84.49, C 5.51, Co 10.0
Cutting Tools (Roughing, Steel)	TALIDE S-88, Carbide	W 69.47, Ti 9.60, Ta 5.63, C 7.30, Co 8.0
Cutting Tools (Finishing, Steel)	TALIDE S-90, Carbide	W 69.00, Ti 10.00, Ta 6.10, C 7.40, Co 7.5
Cutting Tools (Light Finishing, Steel)	TALIDE S-92, Carbide	W 69.47, Ti 11.20, Ta 6.56, C 7.77, Co 5.0
Cutting Tools (Precision Boring, Steel)	TALIDE S-94, Carbide	W 69.00, Ti 11.60, Ta 7.03, C 7.87, Co 4.5
Cutting Tools (Roughing, Cast Iron)	TALIDE C-89, Carbide	W 85.90, Ta 2.34, C 5.76, Co 6.0
Cutting Tools (Finishing, Cast Iron)	TALIDE C-91, Carbide	W 87.31, Ta .94, C 5.75, Co 6.0
Cutting Tools (Light Finishing, Cast Iron)	TALIDE C-93, Carbide	W 89.19, Ta .94, C 5.87, Co 4.0
Cutting Tools (Precision Boring, Cast Iron)	TALIDE C-95, Carbide	W 89.66, Ta .94, C 5.90, Co 3.5
Punching, Shearing	TALIDE C-80, Carbide	W 77.92, C 5.08, Co 17.0
Shock Resisting (Intermittent Impact)	TALIDE C-85, Carbide	W 81.68, C 5.32, Co 13.0
Shock Resisting (Repeated Impact)	TALIDE C-80, Carbide	W 77.92, C 5.08, Co 17.0

METALLURGICAL PRODUCTS DEPT., GENERAL ELECTRIC CO., 11147 E. Eight Mile Rd., Detroit 32, Mich. — Listing No. 46

Cutting Tools (Finishing, Cast Iron, Nonferrous) ..... 860, 905 Carbide
Cutting Tools (Finishing & Light Roughing, Steel) ..... 78 Carbide
Cutting Tools (General Purpose, Cast Iron, Nonferrous) .. 860, 883 Carbide
Cutting Tools (General Purpose Machining, Steel) ..... 78B Carbide
Cutting Tools (Heavy Duty Machining, Steel) ..... 370 Carbide
Cutting Tools (Heavy Duty Metal Cutting, Shock Resistant) .. 55A Carbide
Cutting Tools (High Speed, Finishing, Steel, Cast Iron) ..... 030 Carbide
Cutting Tools (Light Roughing, Finishing, Steel) ..... 350 Carbide
Cutting Tools (Machining Alloy Cast Irons & Aluminum) .. 907 Carbide
Cutting Tools (Precision Finishing, Cast Iron, Nonferrous) .. 999 Carbide
Cutting Tools (Precision Finishing, Steel) ..... 330 Carbide
Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous) ..... 44A Carbide
Cutting Tools (Woodworking—Large Tips, Intricate Forms) .. 44A Carbide
Cutting Tools (Woodworking—Small Tips, Simple Form Tools) ..... 883 Carbide
Dies (Blanking & Light Heading) ..... 55B Carbide
Dies (Deep Drawing) ..... 55A Carbide
Dies (Fine Wire Drawing) ..... 44A Carbide
Dies (Fine Wire Drawing, Small Sizes Steel Wire) ..... 999 Carbide
Dies (Heavy Duty Heading) ..... 190 Carbide
Dies (Hot Extrusion, Brass) ..... 608 Chrome Carbide
Dies (Wire Drawing) ..... 779 Carbide
Mechanical Applications (Heavy, Noncutting Metal for Rotors, Balance Weights) ..... Hevimet
Mechanical Applications (Radioactive Shielding) ..... Hevimet
Mechanical Applications (Extreme Wear Resistance) ..... 883 Carbide
Mechanical Applications (High Strength, Wear & Shock Resistance) ..... 55A Carbide
Mechanical Applications (Wear & Light Shock Resistance) .. 44A Carbide
Mechanical Applications (Wear, With Corrosion & Heat Resistance) ..... 608 Chrome Carbide
Mining Tools (Coal) ..... 55A Carbide
Mining Tools (Rotary & Percussion Type) ..... 90 Carbide

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

A. MILNE & CO., 67 W. 44th St., New York 36, N. Y. — Listing No. 47

Bushing (Drill Jig, Die Set, High Wear Resistance)	GRAPH-MO®	O6	C 1.50, Mn 1.00 Max, Mo .25 Avg., Si .50 Avg.	Oil Mach. 160 Movement A
Cold Drawing Dies	GRAPH-AIR		C 1.35, Mn 1.85, Si 1.20, Ni 1.85, Mo 1.50	Air Mach. 120 Movement +A
Cold Drawing Dies	GRAPH-TUNG®	WW	C 1.50, Mn .40 Max, W 2.80 Avg., Mo .50, Si .60-.70	Water Mach. 100 Movement C
Cold Drawing Dies	(See GRAPH-MO, Listed Above)			
Cold Drawing Dies	HIGH PRODUCTION	D2	C 1.55, Cr 11.50, Mo .75, V 1.00	Air, Oil Mach. 60 Movement +A
Cold Drawing Dies	Air Hardening			
Cold Heading Dies (Also Nonferrous Cold Drawing Dies)	GRAPH-AL®	WA1	C 1.50, Mn .30 Max, Si .15-.25, Ni .Al .12-.20	Water Mach. 160 Movement C
	Water Hardening			
Cold Work Dies (Blanking, Forming)	AMC	T1	Cr 4.00, W 18.00, V 1.00	Oil, Hot Salt, Air Mach. Movement +A .55
	Oil, Air Hardening, High Speed			
Cold Work Dies (Blanking, Forming)	AMCOH	O1	C .95, Mn 1.25, Cr .50, W .50	Oil Mach. 80 Movement A
	Standard Oil Hardening			
Cold Work Dies (Blanking, Forming)	DOUBLE SEVEN	D5	C 1.35, Cr 12.50, Mo .60, Co 3.00	Air, Oil Mach. 45 Movement +A
	Air Hardening			
Cold Work Dies (Blanking, Forming)	DOUBLE SIX	D3	C 2.25, Cr 13.00	Oil, Air Mach. 45 Movement +A
	Air Hardening			
Cold Work Dies (Blanking, Forming)	(See GRAPH-AIR, Listed Above)			
Cold Work Dies (Blanking, Forming)	ORANGE LABEL	W1	C 1.00-1.10	Water Mach. 100 Movement C
	Water Hardening			
Cold Work Dies (Blanking, Forming)	(See GRAPH-TUNG, GRAPH-MO, HIGH PRODUCTION, Listed Above)			
Cutting Tools (Finishing)	(See AMC, Listed Above)			
Cutting Tools (Finishing)	MMV	M3	C 1.15, W 6.40, Mo 5.00, V 1.90	Oil, Hot Salt, Air Mach. Movement +A .60
	Oil, Air Hardening, High Speed			
Cutting Tools (Finishing)	MM6&6	M1	C .85, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Hot Salt Mach. 60 Movement +A
	Oil, Air Hardening, High Speed			
Cutting Tools (Roughing)	MMCO	M36	W 5.80, M 5.20, Cr 4.00, V 2.00, Co 9.00	Oil, Hot Salt, Air Mach. Movement +A .50
	Oil, Air Hardening, High Speed			
Cutting Tools (Roughing)	MAJOR	T5	Cr 4.00-5.00, W 21.00-22.00, Mo .50, V 1.50, Co 13.00	Oil, Hot Salt, Air Mach. Movement +A .45
	Oil, Air Hardening, High Speed			
Cutting Tools (Roughing)	(See AMC, MMV, MM6&6, Listed Above)			
Diecast Dies (Aluminum)	M 330		C .30, Cr 3.00, Mo 3.00, V .60	Air Mach. 80 Movement A
Diecast Dies (Aluminum)	M 333		C .30, Cr 3.00, Mo 3.00, V .60, Co 2.25	Air Mach. 75 Movement A
Diecast Dies (Brass)	(See M 333, Listed Above)			
Diecast (Ejector Pins)	(See M 330, Listed Above)			
Diecast (Ejector Pins)	M 331		C .40, Mn .55, Si 1.00, Cr 3.30, Mo 2.25, V .50	Air Mach. 75 Movement A
Diecasting Dies	AO20	S1	C .50, Cr 1.50, W 2.25, V .25	Oil, Water Mach. 70 Movement B
	Water, Oil Hardening			
Diecasting Dies	CMV	H13	C .38, Cr 5.25, Mo 1.25, V 1.05, Si 1.00	Air, Oil Mach. 80 Movement +A
	Air Hardening			
Diecasting Dies	CMW	H12	C .35, Cr 5.00, W 1.30, Mo 1.75, Si 1.00	Oil, Air Mach. 80 Movement +A
	Air Hardening			
Gages	(See AMCOH, GRAPH-MO, GRAPH-TUNG, HIGH PRODUCTION, Listed Above)			
Gages (Master, Gage Blocks)	(See GRAPH-MO, Listed Above)			
High Stress, High Wear Machinery Parts	(See GRAPH-MO, GRAPH-TUNG, MSM, Listed Above)			
Hot Work Dies	(See M 333, Listed Above)			
Hot Work Dies (Hot Extrusion)	MX-15		C .50, W 12.00, Cr 4.00, Ni 12.00, V 1.00	
	Precipitation Hardening			
Hot Work Dies (Hot Forming)	(See AMC, AO20, CMW, Listed Above)			
Hot Work Dies (Hot Forming)	3074 HOT WORK		C .35, Cr 4.00, W 5.00-10.00, V .50	Oil, Air Mach. 55 Movement A
	Oil, Air Hardening			
Hot Work Dies (Hot Forming)	(See M 330, Listed Above)			
Hot Work Dies (Hot Punching, Shearing)	(See AMC, AO20, CMW, 3074 HOT WORK, Listed Above)			
Lathe Centers	(See GRAPH-TUNG, Listed Above)			
Plastic Molding Dies (Ejector Pins)	MSM	S5	C .55, Mn .80, Mo .50, V .25, Si 2.00	Oil, Water Mach. Movement B
	Water, Oil Hardening			
Plastic Molding Dies (Ejector Pins)	(See AO20, Listed Above)			
Plastic Molding Master Hubs	(See AO20, Listed Above)			
Plastic Molding Dies (Hubs)	(See AMCOH, AO20, GRAPH-MO, HIGH PRODUCTION, MSM, Listed Above)			
Plastic Molding Dies (Machine Cavities)	(See AMCOH, GRAPH-MO, Listed Above)			
Punching and Shearing	MILTUFF		C .50, Cr 3.25, Mo 1.40, Mn .70	Air, Oil Mach. 95 Movement A
	Air, Oil Hardening			
Punching and Shearing	(See AMCOH, DOUBLE SEVEN, GRAPH-MO, HIGH PRODUCTION, MSM, ORANGE LABEL, Listed Above)			
Shock Resisting (Repeated, Intermittent Impact)	(See AO20, MILTUFF, GRAPH-AL, GRAPH-TUNG, MSM, ORANGE LABEL, Listed Above)			

® Made by Timken Roller Bearing Co.

NEWCOMER PRODUCTS INC., P.O. Box 272, Latrobe, Pa. — Listing No. 48

Cutting Tools (General Machining, Average Roughing & Finishing of Steels) ..... NS-2, Carbide

Cutting Tools (General Machining, Cast Iron, Nonferrous) ..... NC-3, Carbide

Cutting Tools (General Purpose, Cast Iron, Nonferrous)—NEWPRO ..... C-35, Carbide

Cutting Tools (General Purpose, Steel)—NEWPRO ..... S-35, Carbide

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Heavy Interrupted Roughing of Steels)	NS-65, Carbide			
Cutting Tools (Heavy Roughing, Cast Iron, Nonferrous)	NC-5, Carbide			
Cutting Tools (High Speed Finishing, Cast Iron, Nonferrous)	NC-2, Carbide			
Cutting Tools (High Velocity Machining)	NEWMET NM-95, Carbide			
Cutting Tools (Milling, General Machining of Steels)	NS-3, Carbide			
Cutting Tools (Precision Finishing, Boring, Hard Steel)	NS-17, Carbide			
Cutting Tools (Precison Finishing, Tough Steel Alloys)	NS-15, Carbide			
Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous)	NC-4, Carbide			
Cutting Tools (Rough Turning of Forgings, Rolled, Abrasive Steels)	NS-4, Carbide			
Cutting Tools (Slow Speed, Heavy Feed Roughing of Steels)	NS-6, Carbide			

NORTH AMERICAN STEEL CO., 4531 Hough Ave., Cleveland 3, Ohio — Listing No. 49

Brake Dies	SHEFFIELD P. B.			Oil Movement B
Bushings (Cutting Dies)	DEXITE TUBING			Oil Movement A
Cold Work Dies	DEXITE #14			Oil Movement A
Dies	DEXITE AH			Air Movement A
Dies	DEXITE FLAT GROUND STOCK			Oil, Air Movement A
Hand Tools	NASCO			Water Movement B
High Tensile Shafting	SHEFFIELD #20			
Machined Parts	DEX-TUNG			Water Movement B
Pneumatic Tools	NASCOLOY			Oil, Water Movement B

PENINSULAR STEEL CO., 24401 Groesbeck Highway, P.O. Box 3853, Park Grove Station, Detroit 5, Mich. — Listing No. 50

Coining, Swaging Dies	BROWN LABEL Oil Hardening	S1	C .47-.53, Mn .15-.25, Cr 1.10-1.30, W 2.25-2.75, V .15-.25, Si .65-.85	Oil Mach. 80 Movement + B
Cold Work Dies (Blanking, Forming)	BLACK LABEL Water Hardening	W4	C 1.05-1.15, Cr .50-.60, V .15-.25	Water Mach. 95 Movement —C
Cold Work Dies (Blanking, Forming)	BLUE LABEL Water Hardening	W2	C 1.00-1.10, V .15-.25	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Forming, etc.)	GRAPH-MO Oil Hardening	O6	C 1.50 Avg., Mn .50 Max., Mo .25 Avg., Si .50 Avg.	Oil Mach. 100 Movement A
Cold Work Dies (Bar, Tube Drawing, Draw Dies, Stainless)	GRAPH-TUNG Water Hardening		C 1.50 Avg., Mn .50 Max., W 2.50 Avg., Mo .50 Avg., Si .65 Avg.	Water, Brine Mach. 85 Movement B
Cold Work Dies (Blanking, Cold Forming)	PEN AIR #5 Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air Mach. 65 Movement + A
Cold Work Dies (Blanking, Forming, Coining, Punching, Rolling)	WHITE LABEL Oil, Air Hardening	D2	C 1.40-1.60, Cr 11.00-13.00, Mo .70-.90, V .30-.40	Air Mach. 75 Movement + A
Cold Work Dies (Forming, Rolling, Blanking)	YELLOW LABEL Oil Hardening	O1	C .85-.95, Mn 1.10-1.25, Cr .40-.60, W .40-.60, V .15-.25, Si .20-.40	Oil Mach. 85 Movement + B
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR (Yellow Label) Oil Hardening	O1	C .90, Mn 1.20, V .20, Cr .50, W .50	Oil Mach. 90 Movement + B
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR (Graph Mo)	O6	C 1.50, Mn 1.00, Mo .50, Si .125	Oil Mach. 100 Movement + A
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR (White Label) Air Hardening	D2	C 1.55, Cr 11.50, Mo .80, V .40	Air Mach. 50 Movement + A
Cold Work Dies (Press Brake Forming)	PENCO BD-30		C .51, Mn .87, Cr .95, Mo .20	Mach. 80
Cutoff Bushing	GRAPH-TUNG (Listed Above)			
Dies (Bars, Tube Drawing, etc.)	GRAPH-AL Water Hardening		C 1.50 Avg., Mn .30 Max., Si .15-.25, Al .12-.20	Water, Brine Mach. 100 Movement B
Diecasting Dies	PENCO HI-VAN Air Hardening	H13	C .38, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement + A
Diecasting Dies	CR-MO-W	H12	C .35, Cr 5.15, W 1.55, Mo 1.65, Si 1.05	Air Mach. 70 Movement + A
Hobbed Cavities	O.C.S.	P5	C .06 Max., Mn .30, Cr .95, B added, Mo .25	Oil Mach. 50 Movement B
Hot Work Dies	(See CR-MO-W & PENCO HIVAN, Listed Above)			
Lathe Centers	GRAPH-TUNG (Listed Above)			
Master Gages, Hobs	WHITE LABEL (Listed Above)			
Plastic Mold Dies (Hubbed Cavity Dies)	PENCO ACS Air Hardening	P4	C .07, Mn .40, Si .25, Cr 4.50	Oil, Air Mach. 65 Movement + A
Plastic Mold Master Hobs	BROWN LABEL (Listed Above)			
Plastic Molds (Machined Cavities)	LUSTRE DIE		C .50, Cr 1.00, Mn .90	Prehardened
Plastic Molds (Hubs)	YELLOW LABEL (Listed Above)			
Punches (Blanking, Forming, Piercing, etc.)	GRAPH-MO (Listed Above)			
Punching, Shearing	SILVER LABEL Water, Oil Hardening	S5	C .55-.60, Mn .65-.80, Mo .40-.50, V .16-.25, Si 1.70-2.00	Water, Oil Mach. 100 Movement + B
Punching, Shearing	(See BLACK LABEL, BLUE LABEL, WHITE LABEL, Listed Above)			
Shock Resisting	BROWN LABEL (Listed Above)			
Shock Resisting (Tool Shanks)	SILVER LABEL (Listed Above)			
Shock Resisting Tools (Repeated Impact)	AIR-SHOCK Air Hardening		C .50, Mn .70, Cr 3.25, Mo 1.40	Air Mach. 90 Movement + A
Tool Shanks, Wrenches	GREEN LABEL (Listed Above)			
Tube Drawing Mandrels	GRAPH-AL (Listed Above)			

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

PENNSYLVANIA STEEL CORP., 12270 Coyle Ave., Detroit 27, Mich. — Listing No. 51

Blanking, Forming	L. T. A. Air Hardening		C 1.00, Mn 2.00, Cr .90, Mo .90	Air Movement A
Cold Work (Dies, etc.)	DYCRO Air Hardening	D2	C 1.55, Cr 11.50, V .25, Mo .75	Air Movement A
Cold Work (Dies, etc.)	PENN AIR Air Hardening	A2	C 1.00, Mn .45, Si .40, Cr 5.15, V .40, Mo 1.10	Air Movement A
Cold Work (Punches, etc.)	BULL DOG Oil Hardening	S1	C .50, Cr 1.20, V .25, W 2.50	Oil, Water Movement B
Cutting Tools	PENN-CUT 18-4-1—HSS	T1	C .73, Cr 4.00, V 1.00, W 18.00	Air, Oil Movement A-B
Cutting Tools	PENN-CUT-MOLY 6-6-2—HSS	M2	C .83, Cr 4.15, V 1.90, W 6.40, Mo 5.00	Air, Oil Movement A-B
Cutting Tools	PENN-CUT-5 18-4-1-5—HSS	T4	C .73, Cr 4.00, V 1.00, Mo .50, W 18.00, Co 5.00	Air, Oil Movement A-B
Hot Work	NITUNG Hot Work		C .30, Cr 2.75, Mo .30, W 9.50, Ni 1.60	Air, Oil Movement A-B
Hot Work	P. H. VAN Air Hardening	H13	C .40, Si 1.10, Cr 5.25, V 1.00, Mo 1.25	Air Movement A-B
Hot Work	P.H.W. Air Hardening	H12	C .35, Si 1.00, Mo 1.50, Cr 5.00, W 1.25	Air, Oil Movement A
Hot Work	P.H. 9 Hot Work	H21	C .35, Cr 2.75, V .30, W 9.00	Air, Oil Movement A-B
Hot Work	P.H. 14		C .42, Cr 3.50, V .30, W 14.00	Air, Oil Movement A-B
Punching, Shearing	SHEAR CUT Water, Oil Hardening	S5	C .55, Mn .85, Si 2.00, Cr .25, V .30	Oil, Water Movement B
Special Purpose Machine Parts	FLEXOR Special Alloy		C .34, Mn-Cr-Si-Mo-W-Special	Oil Movement A
Special Tools and Machine Parts	PENN-FLEX Heat Treated Alloy		C .33, Mn .72, Cr .55, Si .25, W .42, Mo .45	Oil Movement A
Tools (Dies, etc.)	TEMPO Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50	Oil Movement A

H. K. PORTER COMPANY, INC., VULCAN-KIDD STEEL DIVISION, Aliquippa, Pa. — Listing No. 52

Cold Heading Dies	SPECIAL First Quality Carbon	W1	C Various, Mn .30, Si .25	Brine, Water Mach. 100 Movement —C
Cold Heading Dies	EXTRA High Quality Carbon	W1	C Various, Mn .30, Si .25	Brine, Water Mach. 100 Movement —C
Cold Heading Dies	FORT PITT Carbon	W1	C Various, Mn .30, Si .25	Brine, Water Mach. 100 Movement —C
Cold Heading Dies	SPECIAL VANADIUM Carbon-Vanadium	W2	C Various, Mn .30, Si .25, V .30	Brine, Water Mach. 100 Movement —C
Cold Heading Dies (Inserts)	HI-PRO High Carbon, High Chromium	D3	C 2.20, Mn .35, Si .30, Cr 12.25, V .25	Oil, Air Mach. 40 Movement + A
Cold Heading Dies (Inserts)	ALIDIE High Carbon, High Chromium	D2	C 1.55, Mn .30, Si .30, Cr 12.00, V .25, Mo .75	Air Mach. 65 Movement + A
Cold Heading Dies (Inserts)	TM-6 High Speed	M2	C .83, Mn .30, Si .30, W 6.40, Cr 4.15, V 1.90, Mo 5.00	Oil, Air, Salt Mach. 70 Movement + A
Cold Heading Dies (Inserts)	CROLOY High Carbon, High Chromium, High Vanadium	D2	C 1.50, Mn .35, Si .25, Cr 12.60, V .95, Mo .75	Oil Mach. 65 Movement + A
Cold Heading Dies (Inserts)	WOLFRAM High Speed	T1	C .73, Mn .30, Si .30, W 18.25, Cr 4.00, V 1.10	Oil, Air, Salt Mach. 70 Movement + A
Cold Heading Dies (Press Fit Holders)	AUTO Chromium-Vanadium Alloy	L2	C Various, Mn .80, Si .25, Cr 1.00, V .20	Oil, Water Mach. 85 Movement + B
Cold Heading Dies (Shrink or Press Fit Holders)	TCM Air Hardening Hot Work	H12	C .35, Mn .40, Si 1.00, W 1.40, Cr 5.00, V .25, Mo 1.50	Air Mach 80 Movement + A
Cold Work Dies (Blanking)	TM-6-FM High Speed	M2-FM	C .83, Mn .30, Si .30, W 6.40, Cr 4.15, V 1.90, Mo 5.00	Oil, Air, Salt Mach. 80 Movement + A
Cold Work Dies (Blanking)	(See WOLFRAM, TM-6, Listed Above)			
Cold Work Dies (Blanking, Forming)	ALIDIE-FM High Carbon, High Chromium	D2-FM	C 1.55, Mn .30, Si .30, Cr 12.00, V .25, Mo .75	Air Mach. 75 Movement + A
Cold Work Dies (Blanking, Forming)	NONSHRINKABLE Manganese Oil Hardening	O2	C .90, Mn 1.50, Si .30, Cr .20	Oil Mach. 80 Movement + A
Cold Work Dies (Blanking, Forming)	OIL-HARD (Mansil) Oil Hardening	O1	C .90, Mn 1.20, Si .30, W .50, Cr .50	Oil Mach. 80 Movement + A
Cold Work Dies (Blanking, Forming)	NICROMAN Oil Hardening Tough	L6 Mod.	C .70, Mn .45, Ni 1.60, Cr 1.00	Oil Mach. 75 Movement + A
Cold Work Dies (Blanking, Forming)	(See SPECIAL VANADIUM, Listed Above)			
Cold Work Dies (Blanking, Forming)	VAIRLOY Low Temperature Air Hardening	A4	C 1.00, Mn 2.00, Si .30, Cr .90, Mo .90	Air Mach. 80 Movement + A
Cold Work Dies (Blanking, Forming)	VULDIE 5% Chrome	A2	C 1.00, Mn .40, Si .30, Cr 5.25, V .40, Mo 1.15	Air Mach. 75 Movement + A
Cold Work Dies (Blanking, Forming)	VULDIE-FM	A2-FM	C 1.00, Mn .40, Si .30, Cr 5.25, V .40, Mo 1.15	Air Mach. 85 Movement + A
Cold Work Dies (Blanking, Forming)	(See ALIDIE, Listed Above)			
Cold Work Dies (Blanking, Forming)	HARDRITE Tungsten-Chromium	O7	C 1.10, Mn .30, Si .30, W 1.75, Cr .60, V .25	Oil Mach. 85 Movement + A
Cold Work Dies (Forming)	K. R. Carbon-Chromium	W5	C 1.10, Mn .30, Si .25, Cr .60	Brine, Water Mach. 100 Movement —C
Cold Work Dies (Striking)	TUSCA Chromium-Molybdenum-Vanadium		C .50, Mn .60, Si .30, Cr 1.30, V .25, Mo .30	Oil Mach. 75 Movement + A
Cold Work Dies (Striking)	VANADIUM STRIKING DIE Carbon-Vanadium	W2	C .83, Mn .70, Si .25, V .22	Brine, Water Mach. 85 Movement —C

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Striking)	STRIKING DIE Carbon	W1	C .90, Mn .30, Si .25	Brine, Water Mach. 85 Movement —C
Cutting Tools (Broaching)	VUL-MO Molybdenum-Tungsten High Speed	M1	C .82, W 1.50, Cr 3.75, V 1.15, Mo 8.75	Oil, Air, Salt Mach. 60 Movement + A
Cutting Tools (Broaching)	VUL-BRO High Carbon, High Vanadium, Molybdenum-Tungsten High Speed	M3	C 1.10, W 6.00, Cr 4.00, V 3.00, Mo 5.00	Oil, Air, Salt Mach. 50 Movement + A
Cutting Tools (Finishing)	SUPER High Speed	T2	C .80, Mn .30, Si .30, W 18.50, Cr 4.25, V 2.15, Mo .75	Oil, Air, Salt Mach. 45 Movement + A
Cutting Tools (General Purpose)	(See TM-6, TM-6-FM, Listed Above)			
Cutting Tools (General Purpose)	(See WOLFRAM, Listed Above)			
Cutting Tools (Roughing)	WOLFRAM COBALT High Speed	T4	C .72, Mn .30, Si .30, W 18.25, Cr 4.00, V 1.15, Mo .60, Co 5.25	Oil, Air, Salt Mach. 50 Movement + A
Diecasting Dies (Aluminum Base)	(See TCM, Listed Above)			(See Above)
Diecasting Dies (Aluminum Base)	VULCAST Hot Work and Diecasting	H13	C .40, Mn .40, Si 1.00, Cr 5.00, V 1.00, Mo 1.35	Air Mach. 75 Movement + A
Diecasting Dies (Brass)	A-42 Tungsten-Nickel Hot Work	H21 Mod.	C .30, Mn .30, Si .30, W 9.75, Cr 2.75, Ni 1.65	Oil, Air Mach. 60 Movement + A
Diecasting Dies (Brass)	30 CALO FERRO Tungsten Hot Work	H21	C .30, Mn .30, Si .30, W 9.75, Cr 3.25, V .50	Oil, Air Mach. 60 Movement + A
Gages	(See WOLFRAM, TM-6, ALIDIE, VULDIE, VAIRLOY, OIL-HARD, NONSHRINKABLE, SPECIAL VANADIUM, Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	(See A-42, 30 CALO FERRO, Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	TM-6, LOW CARBON Hot Work	H42	C .63, Mn .30, Si .30, W 6.40, Cr 4.15, V 1.90, Mo 5.00	Oil, Air, Salt Mach. 65 Movement + A
Hot Extrusion Dies (Copper, Brass, Bronze)	RMK Chromium Cold Work and Hot Work	H12 Mod.	C .52, Mn .30, Si 1.10, Cr 5.00, V 1.00, Mo 1.55, Ni 1.50	Air Mach. 75 Movement + A
Hot Extrusion Dies (Aluminum, Magnesium)	(See TCM, VULCAST, Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	WOLFRAM, LOW CARBON Hot Work	H26	C .58, Mn .30, Si .30, W 18.25, Cr 4.00, V 1.10	Oil, Air, Salt Mach. 60 Movement + A
Hot Work Dies	(See TCM, VULCAST, Listed Above)			
Hot Work Dies	(See WOLFRAM, LOW CARBON, TM-6, LOW CARBON, Listed Above)			
Hot Work Dies	(See 30 CALO FERRO, A-42, Listed Above)			
Hot Work Dies	50 CALO FERRO Tungsten Hot Work	H24	C .50, Mn .30, Si .30, W 14.75, Cr 3.00, V .50	Oil, Air Mach. 75 Movement + A
Hot Work Dies	6-HW Chromium Hot Work		C .60, Mn .30, Si .30, Cr 4.00, V .75, Mo .45	Air Mach. 80 Movement + A
Hot Work Dies	4-HW Chromium Hot Work		C .95, Mn .30, Si .30, Cr 4.00, V .75, Mo .45	Air Mach. 80 Movement + A
Hot Work Dies	VUL-MAX High Nickel Hot Work		C .40, Cr 1.60, V .20, Mo .85, Ni 4.5	Air Mach. 60 Movement + A
Hot Work Dies	MAGAL Air Hardening Hot Work	H11	C .35, Mn .35, Si 1.00, Cr 5.00, V .45, Mo 1.30	Air Mach. 75 Movement + A
Hot Work Dies (High Toughness)	A-41 Hot Work		C .45, Mn .70, Si .25, Cr 1.60, V .25, Mo 1.10	Oil, Air Mach. 85 Movement + B
Machinery Parts (High Stress, Good Wear)	(See AUTO, Listed Above)			
Machinery Parts (High Stress, Good Wear)	SUPERIOR CHROME Tool Steel	L1	C 1.05, Mn .35, Si .30, Cr 1.40	Oil, Water Mach. 80 Movement + A
Plastic Molding Dies (Hubbed Die Cavities)	PLASTIC DIE Refined Plastic Mold Steel	P1	C .08 Max.	Carburize, Mach. 40 Water Harden Movement + C
Plastic Molding Dies (Hubbed Die Cavities)	VULMOLD Alloy Hubbing	P2	C .10 Max., Mn .70, Si .25, Cr 1.40, Mo .25, Ni .50	Carburize, Mach. 40 Oil Harden Movement + C
Plastic Molding Dies (Hubs)	Q. A. Tungsten-Chromium Shock Resisting	S1	C .47, Mn .30, Si .25, W 2.20, Cr 1.20, V .25	Oil, Water Mach. 80 Movement + A
Plastic Molding Dies (Machine Cut Cavity Dies)	(See VAIRLOY, OIL-HARD, NONSHRINKABLE, Listed Above)			
Punching, Shearing	(See ALIDIE, VULDIE, VAIRLOY, OIL-HARD, NONSHRINKABLE, SPECIAL VANADIUM, Q. A., Listed Above)			
Punching, Shearing	HECLA Shock Resisting	L2	C .50, Mn .60, Si .25, W .25, Cr 1.00, V .25	Oil, Water Mach. 75 Movement + C
Punching, Shearing	HECLA SPECIAL Shock Resisting	L2 Mod.	C .65, Mn .60, Si .25, W .25, Cr 1.00, V .25	Oil, Water Mach. 75 Movement + C
Punching, Shearing	BLUE EDGE Shock Resisting	S3	C .50, Mn .30, Si .30, W 1.00, Cr 1.00	Oil, Water Mach. 85 Movement + B
Punching, Shearing (Maximum Toughness)	4870 Silico-Manganese Punch and Shear	S4	C .55, Mn .85, Si 2.00, Cr .25, V .25	Oil, Water Mach. 85 Movement + B

HORACE T. POTTS CO., E. Erie Ave. & D St., Philadelphia 34, Pa. — Listing No. 53

Diecasting Dies, Plastic Molding Dies, High Strength Machinery Parts	ELASTUF 44	C .50 Bal. Cr, Ni, Mo, Fe	Prehardened (Rc 44) Commercially Machinable
High Strength, Toughness, Machinery Parts	ELASTUF Pb	C .50, Bal. Cr, Mo, Fe (leaded)	Prehardened (Rc 30) Commercially Machinable
High Strength, Toughness, Machinery Parts	ELASTUF TYPE A-2	C .50, Bal. Cr, Mo, V, Fe	Prehardened (Rc 32) Commercially Machinable

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement -- "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

PYRAMID STEEL CO., P.O. Box 1226, Cleveland 3, Ohio — Listing No. 54

Abrasive Plates	MANGO PLATE			Water
Brake Dies	CHROMODI			Oil Movement B
Dies (All Types)	PYR-OH-DIE			Oil Movement A
Dies (All Types)	PYR-AH-DIE			Air Movement A
Hi-Stress Nonwear Machine Parts	MAINTENAL			Oil Movement A
Hi-Stress Shafting Heat Treated	SILVALOY			
Hi-Stress Studs Heat Treated	MAINTENAL STUD STOCK			
Shock Resisting Tools	NU-PYR-LOY			Oil Movement B
Shock Resisting Hand Tools	SU-PYR-LOY			Water Movement A
All Purpose Tool Room	TUNGSITE			Oil & Water Movement B

REPUBLIC STEEL CORP., 1441 Republic Bldg., Cleveland 1, Ohio — Listing No. 55

Cold Work (Forming)	C-C Water Hardening	W5	C 1.10, Mn .30, Cr .60	Water Mach. 85 Movement —B
Cold Work (Forming)	UA-8 Water Hardening	L7	C 1.00, Mn .35, Cr 1.35, Mo .35	Water, Oil Mach. 80 Movement B
Cold Work (Hubs)	C-V Oil Hardening	S1	C .50, Mn .30, Cr 1.20, W 2.20, V .25	Water, Oil Mach. 85 Movement + B
Cold Work (Punching, Shearing, Forming)	DUMOST #1 Water Hardening	W2	C .85, Mn .30, V .30	Water Mach. 90 Movement —B
Cold Work (Punching, Shearing, Forming)	DUMOST #2 Water Hardening	W2	C .95, Mn .30, V .30	Water Mach. 90 Movement —B
Cold Work (Punching, Shearing, Forming)	EXTRA CARBON Water Hardening	W1	C .65-1.40, Mn .30, Si .15-.30	Water Mach. 100 Movement —B
Cold Work (Punching, Shearing, Forming)	SPECIAL CARBON Water Hardening	W1	C .65-1.40, Mn .30, Si .15-.30	Water Mach. 100 Movement —B
Cold Work (Punching, Shearing, Forming)	STANDARD CARBON Water Hardening	W1	C .65-1.00, Mn .30, Si .15-.30	Water Mach. 100 Movement —B
Cold Work (Forming, Shearing)	UA-6 Oil Hardening		C .65, Mn .60, Cr 1.00, W .25, V .25	Oil, Water Mach. 75 Movement —B
Cold Work Dies (Blanking, Forming)	DUMOST #3 Water Hardening	W2	C 1.10, Mn .30, V .30	Water Mach. 85 Movement —B
Cold Work Dies (Blanking, Forming, Shearing)	AIRALOY Air Hardening	A4	C 1.00, Mn 2.00, Cr .90, Mo .90	Air Mach. 65 Movement + A
Cold Work Dies (Blanking, Forming, Shearing)	ARRESTITE Oil Hardening	O2	C .90, Mn 1.50, Cr .20	Oil Mach. 90 Movement A
Cold Work Dies (Blanking, Forming, Shearing)	H-C	D3	C 2.20, Mn .35, Si .30, Cr 12.25	Oil Mach. 40
Cold Work Dies (Blanking, Forming, Shearing)	KROMAIR	A2	C 1.00, Cr 5.25, Mo 1.15, V .25	Air Movement A
Cold Work Dies (Blanking, Forming, Shearing)	SPECIAL OIL HARDENING Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Forming, Shearing)	104 Air Hardening	D2	C 1.55, Cr 12.00, Mo .75, V .25	Air, Oil Mach. 50 Movement + A
Cutting Tools (Finishing)	FAST FINISHING Water Hardening	F2	C 1.35, W 3.50	Water Mach. 65 Movement —C
Cutting Tools (Roughing)	B-F HIGH-SPEED High Speed	T1	C .72, Mn .30, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 50 Movement + A
Cutting Tools (Roughing)	COBALT HIGH SPEED High Speed	T4	C .72, Mn .30, Cr 4.00, W 18.00, Mo .50, V 1.00, Co 5.00	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	SPECIAL M-O High Speed	M2	C .82, Mn .30, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Air Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	IXL High Speed	T2	C .80, Mn .30, Cr 4.00, W 19.00, Mo .75, V 2.00	Oil, Air Mach. 45 Movement + A
Diecasting Dies (Brass)	RESCO Air Hardening		C .30, Cr 2.75, W 9.50, Mo .25, Ni 1.75	Air, Oil Mach. 70 Movement + B
Diecasting Dies (Aluminum)	V-HW Air Hardening	H13	C .40, Cr 5.00, Mo 1.25, V 1.00, Si 1.00	Air Movement A
Hot Work (Forming, Shearing)	6-H-W Air Hardening		C .60, Cr 4.00, Mo .45, V .75	Air, Oil Mach. 75 Movement + B
Hot Work Dies (Forming, Punching)	10-H-W Air Hardening	H12	C .35, Cr 5.00, W 1.25, Mo 1.50, Si 1.00, V .25	Air, Oil Mach. 70 Movement B
Hot Work (Hot Forming)	XX-SUPERIOR Air Hardening		C .90, Cr 4.00, Mo .45, V .75	Air, Oil Mach. 75 Movement + B
Hot Work (Punching, Forming)	AIR HARDENING #30 Air Hardening	H21	C .30, Cr 3.50, W 9.00, V .50	Air, Oil Mach. 70 Movement + B
Hot Work (Punching, Shearing, Forming)	AIR HARDENING #40 Air Hardening	H24	C .50, Cr 3.00, W 15.00, V .50	Air, Oil Mach. 65 Movement —B
Hot Work (Punches, Dies)	(See C-V, Listed Above)			
Hot Work (Punching, Forming)	(See RESCO, Listed Above)			
Hot Work Dies (Punching, Shearing, Forming)	12-HW		C .52, Mn .30, Si 1.10, Cu 5.00, V 1.00, Mo 1.55, Ni 1.50	Air Mach. 70
Hot Work (Punching, Forming)	550 Oil Hardening		C .45, Mn .65, Cr 1.60, Mo 1.10, V .25	Oil Mach. 80 Movement + B
Plastic Mold Dies (Hubbed Cavities)	PLASTIC DIE Water Hardening	P1	C .08 Max., Mn .10 Max.	
Shock Resisting (Intermittent Impact)	UA-4 Oil Hardening		C .50, Mn .60, Cr 1.00, W .25, V .25	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	M-TUNGSTEN Oil Hardening	S3	C .50, Mn .35, Cr 1.00, W 1.00	Oil, Water Mach. 80 Movement B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Shock Resisting (Repeated Impact)	SPECIAL AUTO-A Oil Hardening		C .30, Mn .65, Cr .90, V .20	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	SPECIAL AUTO-D Oil Hardening		C .50, Mn .65, Cr .90, V .20	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	SPECIAL PUNCH Water Hardening	S1	C .55, Mn .85, Cr .30, V .30, Si 2.00	Water, Oil Mach. 80 Movement — B

JOS. T. RYERSON & SON INC., P.O. Box 8000-A, Chicago 80, Ill. — Listing No. 56

Chisels—Drills	V.D. CHISEL STEEL Water Hardening		C .77, Mn .35, Mo .18, Si .23	Water
Cold Work Dies (Blanking & Forming)	RY-ALLOY Oil Hardening	O2	C .95, Mn 1.60, Mo .25, Si .25	Oil Mach. 90 Movement A
Cold Work Dies (Blanking & Forming)	RY-ALLOY FLAT Ground Stock	O2	C .95, Mn 1.60, Mo .25, Si .25	Oil Mach. 90 Movement A
Cold Work Dies (Blanking & Forming)	V.D. Water Hardening	W2	C 1.00, Mn .23, V .18, Si .25	Water Mach. 95 Movement C
Cutting Tools	(See V.D., RY-ALLOY, Listed Above)			
Diecasting Dies	NITRALLOY 135 MOD. Heat Treated		C .40, Mn .60, Mo .35, Cr 1.70, Al 1.20, Si .35	Mach. 125
Gages	(See V.D., RY-ALLOY, RY-ALLOY FLAT, Listed Above)			
High Stress, High Wear Machinery Parts	NEW RYCUT 50 Heat Treated		C .50, Bal. Cr, Mo, Fe, Leaded	Mach. Annld. 215 H.T. 165
High Stress, High Wear Machinery Parts	RYCROME Heat Treated		C .40, Bal. Cr, Mo, Fe	Mach. H.T. 137
High Stress, High Wear Machinery Parts	RYCUT 40 Heat Treated		C .40, Bal. Cr, Mo, Fe, Leaded	Mach. Annld. 225 H.T. 185
High Wear Machinery Parts	RYCUT 20		C .20, Bal. Ni, Cr, Mo, Fe, Leaded	Mach. 225
High Stress, High Wear Machinery Parts	(See NITRALLOY 135 MOD., Listed Above)			
Plastic Forming Dies	RY-ALLOY	(Listed Above)		
Plastic Molding Dies (Ejector Pins)	RY-ALLOY DRILL Rod	O2	C .95, Mn 1.60, Mo .25, Si .25	Oil Mach. 90 Movement A
Plastic Molding Dies (Ejector Pins)	RYERSON CARBON Drill Rod		C 1.00	Water Mach. 100 Movement B
Press Brake Dies	RYCUT 50 Heat Treated		C .50, Bal. Cr, Mo, S, Fe	Mach. Annld. 175 H.T. 150
Punching & Shearing	(See V.D., RY-ALLOY, Listed Above)			

SANDVIK STEEL INC., 1702 Nevins Rd., Fair Lawn, N. J. — Listing No. 57

Cutting Tools (Extra Rough Machining of Steel) ..... COROMANT S6, Carbide
Cutting Tools (Finishing) ..... COROMANT H2, Carbide
Cutting Tools (Finishing & Light Roughing of Steel) ..... COROMANT S1, S1P, Carbide
Cutting Tools (Finishing, Precision Machining of Steel) ..... COROMANT F1, Carbide
Cutting Tools (Finishing & Roughing of Cast Iron) ..... COROMANT H3, Carbide
Cutting Tools (Finishing & Roughing, Machining of Cast Iron, Light Alloys, etc.) ..... COROMANT H1, Carbide
Cutting Tools (General Purpose) ..... COROMANT SH, Carbide
Cutting Tools (General Purpose Machining of Steel) ..... COROMANT S2, Carbide
Cutting Tools (Rough Machining of Steel) ..... COROMANT S4, Carbide
Cutters (End Mills, Step) ..... (See S1, S4, H1, Listed Above)
Cutting (Milling) ..... (See S1, S4, S6, H1, Listed Above)
Dies (Wire & Tube Drawing, Deep Drawing, Light Heading, and Blanking)
Drills (For Cast Iron & Steel) ..... (See H1, Listed Above)
Scrapers ..... (See H1, H2, Listed Above)

SEABOARD STEEL CO. OF AMERICA INC., 1775 Broadway, New York 19, N. Y. — Listing No. 58

Cold Work (Blanking)	SECOLEO	C .95, Mn 1.20, Cr .55, W .50	Oil Movement A
Cold Work (Blanking)	SECAERO	C 1.10, Mn .80, Cr 5.50, Mo 1.20, V .30, Si .40	Air Movement A
Cutting Tools (Roughing)	SECOBALT (High Speed)	C .70, Mn .30, Cr 4.75, W 18.50, Mo .70, V 1.50, Co 12.00, Si .30	Movement B
Cutting Tools (Finishing)	SECOVAN (High Speed)	C .85, Mn .30, Cr 4.25, W 18.50, Mo .70, V 2.20, Si .30	Movement B
High Tensile Alloy Steel (Torsional Strains and Stresses)	SEABOARD SPECIAL RED LABEL	C .50, Mn 1.10, Si .25, Cr 1.40, Mo .80, Ni .87, P & S .10	
Punching & Shearing (Shock Resisting)	PROGEN	C .37, Mn .50, Cr .80, Mo .80, Cu .70, Si .70	

SIMONDS SAW & STEEL CO., Ohio St., Lockport, N. Y. — Listing No. 59

Cold Work Dies	C.C.M. Air Hardening	D2	C 1.55, Mn .25, Cr 12.00, Mo .80, V .35, Si .35	Air Movement A
Cold Work Dies	SIMONDS AIRTRUE Air Hardening	A2	C 1.00, Mn .65, Si .25, Cr 5.25, Mo 1.00, V .30	Air
Cold Work Dies	SIMONDS S64 Oil Hardening	O2	C .90, Mn 1.50, Mo .25	Oil Movement A
Cold Work Dies	S-12225 Oil Hardening	D3	C 2.00, Mn .35, Si .50, Cr 12.00	Oil Movement A
Cold Work Dies	TEENAX No. 46 Oil Hardening	O1	C .90, Mn 1.25, Cr .50, W .50, V .20, Si .20	Oil Movement A
Cutting Tools	BLUE LABEL Water Hardening	W1	C as desired, P .02 max., S .02 max., V optional	Water

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools	DIAMOND S Water Hardening	W1	C as desired, P .025 max., S .025 max., V optional	Water
Cutting Tools	LOCKPORT SPECIAL High Speed	T2	C .80, Cr 4.25, W 18.50, Mo .70, V 2.25	
Cutting Tools	MOLVA-T High Speed	M2	C .80, Cr 4.00, W 5.75, Mo 4.50, V 1.60	
Cutting Tools	RED STREAK High Speed	T1	C .72, Cr 4.00, W 18.00, V 1.00	
Cutting Tools	S.T.M. High Speed	M1	C .80, Cr 3.75, W 1.50, Mo 8.75, V 1.25	
Cutting Tools	SUPER COBALT High Speed	T5	C .80, Cr 4.00, W 18.00, V 2.00, Co 8.00	
Cutting Tools	TUNCO High Speed	T4	C .75, Cr 4.00, W 18.00, V 1.00, Co 5.00	
Hot Work Dies	CHROME HOT DIE Air Hardening		C 1.00, Mn .30, Cr 4.00, Si .30	Air
Hot Work Dies	D.N.V. Hot Work O.I. Air Hardening	H21	C .32, Mn .30, Cr 3.25, W 9.50, V .40, Si .35	Air, Oil
Shock Resisting	COMMANDO 47 Oil Hardening	S1	C .47, Mn .25, Cr 1.40, W 2.00, Mo .25, V .25, Si .80	Oil
Shock Resisting	HAVOC Water, Oil Hardening	S2	C .50, Mn .40, Mo .50, V .20, Si 1.00	Water
Shock Resisting	ORLEANS Water, Oil Hardening	S5	C .53, Mn .80, Cr .25, Mo .35, V .20, Si 1.95	Oil, Water Movement —C

L. S. STARRETT CO., 101 Crescent St., Athol, Mass. — Listing No. 60

High Production Cold Work Dies	STARRETT PRECISION GROUND DIE STOCK Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.00, V .25, Si .40	Air Mach. 75 Movement +A
Knives, Templates, Dies	STARRETT PRECISION GROUND DIE STOCK Water Hardening	W5	C 1.15, Mn 1.25, Cr .50, Si .25	Water, Brine Mach. 100 Movement —C
Stamps, Punches, Dies	STARRETT PRECISION GROUND DIE STOCK Oil Hardening	O1	C .90, Mn 1.25, Cr .50, W .50, Si .25	Oil Mach. 90 Movement +B

TIMKEN ROLLER BEARING CO., 1835 Dueber Ave. S.W., Canton 6, Ohio — Listing No. 61

Bushings (Drill Jig and Die Set, High Wear Resistance)	GRAPH-MO Oil Hardening	O6	C 1.45 avg., Mn 1.00 max., Mo .25 avg., Si .90 avg.	Oil Mach. 100 Movement A
Cold Work Dies (See GRAPH-MO, Listed Above) (Gibs, Wear Plates, Straightener & Leveller Rolls, Stainless Strip Forming Rolls, Flanging Sections, Commercial Piston Rings, Master & Machine Cams, Wear-Resistant Die Inserts, Machine Tool Parts, Brick Mold Liners and Platen Plates)				
Cold Work Dies (Bar, Tube Drawing, Draw Dies, Stainless)	GRAPH-TUNG Water Hardening		C 1.50 avg., Mn .50 max., W 2.80 avg., Mo .50 avg., Si .65 avg.	Water or Brine Mach. Movement B 85
Cutoff Bushing	(See GRAPH-TUNG, Listed Above)			
Dies (Bar, Tube Drawing, etc.)	GRAPH-AL Water Hardening		C 1.50 avg., Mn .30 max., Si .15-.25, Al .12-.20	Water or Brine Mach. Movement B 100
Dies (Blanking, Cold Forming, etc.)	GRAPH-AIR		C 1.35, Mn 1.85, P .025 max., S .025 max., Si 1.20, Ni 1.85, Mo 1.50	Air Mach. 85 Movement +A
Draw Dies (Deep Draw, Carbon and Stainless)	(See GRAPH-MO, Listed Above)			
Gages (Master, Thread, Ring & Plug, Gage Blocks, and Surface Plates)	(See GRAPH-MO, Listed Above)			
General Purpose (Standard Toolroom Oil Hardening)	(See GRAPH-MO, Listed Above)			
Lathe Centers	(See GRAPH-TUNG, Listed Above)			
Punches (Blanking, Forming, Piercing, etc.)	(See GRAPH-MO, Listed Above)			
Tube Drawing Mandrels	(See GRAPH-AL, Listed Above)			

TUNGSTEN ALLOY MFG. CO. INC., 65 Colden St., Newark 1, N. J. — Listing No. 62

Cutting Tools (Chip Removal, Steel, Semifinishing, Finishing, Precision Boring)	5S, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous, Roughing)	9, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous, General Purpose)	9-H, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous, Light Finishing)	9-C, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous, Precision Boring)	9-B, Carbide
Cutting Tools (Chip Removal, Steel, Heavy Duty Machining)	9S, Carbide
Cutting Tools (Chip Removal, Steel, Finishing)	8T, Carbide
Cutting Tools (Chip Removal, Steel, Roughing)	11T, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose)	10T, Carbide
Impact Application (Light)	9-A15, Carbide
Impact Application (Medium)	9-A20, 20H, Carbide
Impact Application (Heavy)	9-A25, 25H, Carbide
Mining Tools (Rock Bits)	11C, Carbide
Wear Application (Wear Surface, No Shock)	9, Carbide
Wear Application (Wear Surface, Light Shock)	9-M, Carbide
Wear Application (Wear Surface, Heavy Shock)	9-A, Carbide

UDDEHOLM CO. OF AMERICA INC., 155 E. 44th St., New York 17, N. Y. — Listing No. 63

Cold Work Dies (Blanking, Cold Forming)	UHB Water Hardening	W1	C 1.05, Mn .30, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Cold Forming)	UHB EXTRA Water Hardening	W1	C 1.05, Mn .30, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Cold Forming)	UHB-VA Water Hardening	W2	C 1.05, Mn .30, Si .25, V .20	Water Mach. 100 Movement C

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Cold Forming, Coining, Swaging)	UHB-711 Oil Hardening	S1	C .50, Mn .25, Si .75, Cr 1.25, W 2.50, V .20	Oil Mach. 75 Movement + B
Cold Work Dies (Blanking, Stamping, Cold Forming)	UHB-16 Oil Hardening	O1	C .90, Mn 1.20, Si .35, Cr .50, W .50, V .15	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Stamping, Trimming, Cold Forming)	UHB-151 Air Hardening	A2	C 1.00, Mn .60, Si .25, Cr 5.25, Mo 1.10, V .20	Air Mach. 65 Movement + A
Cold Work Dies (Blanking, Stamping, Lamination, Extruding, Thread and Form Rolling, Cold Forming, Powder Compression)	TRIMO Air Hardening	D2	C 1.50, Mn .30, Si .40, Cr 12.00, Mo .80, V .25	Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Stamping, Lamination, Extruding, Cold Forming, Powder Compression)	TRIVAN Oil Hardening	D3	C 2.05, Mn .75, Si .50, Cr 13.00, W 1.25	Oil Mach. 40 Movement + A
Cold Work Dies (Heading)	UHB-19VA Water Hardening	W2	C .92, Mn .30, Si .25, V .10	Water Mach. 100 Movement C
Diecasting Dies	UHB SPECIAL Air Hardening	H12	C .35, Mn .40, Si 1.05, Cr 5.00, W 1.50, Mo 1.65	Air Mach. 70 Movement + A
Diecasting Dies	UHB ORVAR Air Hardening	H13	C .38, Mn .35, Si 1.00, Cr 5.25, Mo 1.35, V 1.00	Air Mach. 70 Movement A
Gages	(See UHB-16, UHB-151, TRIMO, TRIVAN, Listed Above)			
Hot Work Dies (Forging Die Inserts, Hot Swaging Dies)	(See UHB-711, Listed Above)			
Hot Work Dies (Hot Forming, Hot Punching and Shearing)	(See UHB ORVAR, UHB SPECIAL, Listed Above)			
Plastic Molding Dies (Hubbed Cavity Dies)	UHB FORMA Water Hardening	P1	C .05 Max., Mn .10 Max., Si .10 Max.	Water Movement C
Plastic Molding Dies (Hubbed Cavity Dies)	UHB PREMO Oil or Air Hardening	P4	C .04, Mn .10, Si .10, Cr 3.90, Mo .50	Oil or Air Movement A
Plastic Molding Dies (Machine Cut Cavity Dies)	(See UHB-16, Listed Above)			
Plastic Molding Dies (Hubs)	(See UHB-711, TRIMO, Listed Above)			
Punching & Shearing	(See UHB-711, Listed Above)			
Shock Resisting	UHB RESISTO Oil or Water Hardening	S5	C .60, Mn .70, Si 1.55, Mo .45, V .20	Oil or Water Mach. 65 Movement ±B
Shock Resisting	(See UHB-711, Listed Above)			

UNIVERSAL-CYCLOPS STEEL CORP., Titusville, Pa. — Listing No. 64

Cold Work Dies (Blanking, Forming)	ALCO M Oil Hardening	S1	C .50, Mn .25, Si .25, Cr 1.50, W 2.25, V .25, Mo .30	Oil Mach. 85 Movement + B
Cold Work Dies (Blanking, Forming)	ALLOY B Water Hardening	L1	C 1.00, Mn .35, Si .25, Cr 1.35	Water Mach. 95 Movement + C
Cold Work Dies (Blanking, Forming)	CYCLOPS SPECIAL Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Forming)	CYCLOPS STANDARD Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Forming)	DRACO DV Water Hardening	W2	C 1.00, Mn .25, Si .25, V .50	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Forming)	DRACO SPECIAL Water Hardening	W2	C 1.00, Mn .25, Si .25, V .25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Forming)	DRACO STANDARD Water Hardening	W2	C 1.00, Mn .25, Si .25, V .25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Forming)	EK-81 Air Hardening	D5	C 1.35, Mn .30, Si .25, Cr 12.75, Mo .80, Co 3.00	Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Forming)	HERCULES Water Hardening	W7	C 1.00, Mn .30, Si .25, Cr .50, V .20	Water Mach. 95 Movement + C
Cold Work Dies (Blanking, Forming)	MOTUNG P&D Oil or Salt	M1	C .75, Mn .30, Si .30, Cr 4.00, W 1.50, V 1.15, Mo 8.50	Oil or Salt Mach. 60 Movement + B
Cold Work Dies (Blanking, Forming)	N-9 Oil Hardening	L6	C .75, Mn .40, Si .25, Cr 1.00, Ni 1.50	Oil Mach. 80 Movement + B
Cold Work Dies (Blanking, Forming)	ORION Oil Hardening	L2	C .50, Mn .70, Si .25, Cr 1.00, V .20	Oil Mach. 100 Movement + B
Cold Work Dies (Blanking, Forming)	SPARTA Air Hardening	A2	C 1.00, Mn .65, Si .25, Cr 5.25, V .25, Mo 1.10	Air Mach. 75 Movement + A
Cold Work Dies (Blanking, Forming)	SPARTA CV Air Hardening		C 2.30, Mn .65, Si .40, Cr 5.25, W 1.10, V 4.60, Mo 1.10	Air Mach. 60 Movement + A
Cold Work Dies (Blanking, Forming)	THERMOLD J Air Hardening		C .50, Mn .40, Si 1.10, Cr 5.00, V 1.00, Mo 1.40, Ni 1.50	Air Mach. 60 Movement + A
Cold Work Dies (Blanking, Forming)	ULTRADIE #1 Air Hardening	D3	C 2.25, Mn .30, Si .25, Cr 12.00, V .20	Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Forming)	ULTRADIE #2 Air Hardening	D2	C 1.50, Mn .30, Si .25, Cr 12.00, V .20, Mo .80	Air Mach. 55 Movement + A
Cold Work Dies (Blanking, Forming)	ULTRADIE #3 Air Hardening	D2	C 1.50, Mn .30, Si .25, Cr 12.00, V .90, Mo .80	Air Mach. 55 Movement + A
Cold Work Dies (Blanking, Forming)	WANDO Oil Hardening	O1	C .90, Mn 1.20, Si .25, Cr .50, W .50, V .20	Oil Mach. 85 Movement + B
Cutting Tools (Finishing)	B-6 High Speed	T1	C .75, Mn .30, Si .35, Cr 4.00, W 18.00, V 1.20	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Finishing)	B-9 High Speed	T2	C .84, Mn .30, Si .35, Cr 4.50, W 18.25, V 2.25, Mo .50	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Finishing)	MOTUNG High Speed	M1	C .80, Mn .30, Si .35, Cr 4.00, W 1.50, V 1.15, Mo 8.50	Oil or Salt Mach. 65 Movement + B
Cutting Tools (Finishing)	MOTUNG 652 High Speed	M2	C .83, Mn .30, Si .35, Cr 4.00, W 6.00, V 1.90, Mo 5.00	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Finishing)	MOVAN High Speed	M10	C .88, Mn .30, Si .35, Cr 4.00, V 2.10, Mo 8.00	Oil or Salt Mach. 65 Movement + B
Cutting Tools (Finishing)	SATURN Water Hardening	F2	C 1.35, Mn .25, Si .25, W 3.50	Water Mach. 85 Movement + C

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Finishing)	UNICUT High Speed	M3 Type 1	C 1.00, Mn .30, Si .35, Cr 4.00, W 6.25, V 2.40, Mo 6.25	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Roughing)	B-7 High Speed	T4	C .72, Mn .30, Si .35, Cr 4.00, W 18.00, V 1.15, Mo .50, Co 5.00	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Roughing)	B-8 High Speed	T8	C .78, Mn .30, Si .35, Cr 4.25, W 14.00, V 2.25, Mo .50, Co 5.00	Oil or Salt Mach. 60 Movement + B
Cutting Tools (Roughing)	B-10 High Speed	T5	C .78, Mn .30, Si .35, Cr 4.50, W 18.50, V 2.00, Mo 1.00, Co 9.00	Oil or Salt Mach. 55 Movement + B
Cutting Tools (Roughing)	SUPER MOTUNG High Speed	M30	C .82, Mn .30, Si .35, Cr 4.00, W 1.50, V 1.25, Mo 8.25, Co 5.00	Oil or Salt Mach. 65 Movement + B
Cutting Tools (Roughing)	SUPER UNICUT High Speed	M15	C 1.50, Mn .30, Si .35, Cr 4.00, W 6.25, V 4.75, Mo 3.25, Co 5.00	Oil or Salt Mach. 55 Movement + B
Cutting Tools (Roughing)	(See MOTUNG 652, UNICUT, Listed Above)			
Diecasting Dies	K-S Air Hardening	H14	C .40, Mn .35, Si .90, Cr 5.00, W 5.00, Mo .25	Air Mach. 65 Movement + A
Diecasting Dies	THERMOLD A Air Hardening	H11	C .35, Mn .40, Si 1.00, Cr 5.00, V .45, Mo 1.40	Air Mach. 70 Movement + A
Diecasting Dies	THERMOLD AV Air Hardening	H13	C .35, Mn .40, Si 1.00, Cr 5.00, V 1.00, Mo 1.40	Air Mach. 70 Movement + A
Gages	(See CYCLOPS SPECIAL, WANDO, SPARTA, ULTRADIE 1, ULTRADIE 3, MOTUNG, Listed Above)			
Hot Work Dies (Hot Forming)	ALCO S Oil Hardening	S1	C .50, Mn .25, Si 1.00, Cr 1.75, W 2.25, V .25, Mo .50	Oil Mach. 85 Movement + B
Hot Work Dies (Hot Forming)	B-4 Oil Hardening	H24-H25	C .50, Mn .30, Si .25, Cr 2.75, W 15.00, V .50	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	B-6-X Oil Hardening	H26	C .50, Mn .25, Si .35, Cr 3.75, W 17.50, V .90	Oil Mach. 60 Movement + B
Hot Work Dies (Hot Forming)	B-44 Oil Hardening	H22	C .38, Mn .25, Si .35, Cr 3.00, W 11.00, V .40	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	B-44-J Oil Hardening	H21	C .32, Mn .25, Si .35, Cr 3.25, W 9.50, V .50	Oil Mach. 70 Movement + B
Hot Work Dies (Hot Forming)	K-L Oil Hardening		C .35, Mn .60, Si 1.50, Cr 7.25, W 7.25	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	K-M Oil Hardening		C .45, Mn .60, Si 1.50, Cr 7.25, W 7.25	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	K-390 Oil Hardening		C .25, Mn .40, Si .40, Cr 2.75, W 10.00, Ni 2.00	Oil Mach. 55 Movement + B
Hot Work Dies (Hot Forming)	THERMOLD B Air Hardening	H12	C .35, Mn .40, Si 1.00, Cr 5.00, W 1.40, V .30, Mo 1.55	Air Mach. 70 Movement + A
Hot Work Dies (Hot Forming)	THOR Oil Hardening	H23	C .32, Mn .35, Si .50, Cr 12.00, W 12.00, V 1.00	Oil Mach. 50 Movement + B
Hot Work Dies (Hot Forming)	(See THERMOLD A, THERMOLD AV, THERMOLD J, K-S, ALCO M, Listed Above)			
Hot Work Dies (Hot Punching and Shearing)	(See MOTUNG P&D, ALCO M, ALCO S, B-6-X, B-44-J, THERMOLD A, THERMOLD AV, THERMOLD B, THERMOLD J, Listed Above)			
Plastic Molding Dies (Ejector Pins)	VENANGO SPECIAL Oil Hardening		C .65, Mn .50, Si 1.10, V .20, Mo .50	Oil Mach. 90 Movement + B
Plastic Molding Dies (Ejector Pins)	(See CYCLOPS SPECIAL and ALCO M, Listed Above)			
Plastic Molding Dies (Hubs)	(See N-9, WANDO, ALCO M, SPARTA, ULTRADIE 3, Listed Above)			
Plastic Molding Dies (Machine Cut Cavities)	UNILOY 1435 Oil Hardening	420	C .40, Mn .40, Si .30, Cr 13.00	Oil Mach. 70 Movement + B
Plastic Molding Dies (Machine Cut Cavities)	UNILOY 1860 Oil Hardening	440A	C .60, Mn .40, Si .30, Cr 17.00	Oil Mach. 60 Movement + B
Plastic Molding Dies (Machine Cut Cavities)	(See WANDO, THERMOLD AV, THERMOLD B, SPARTA, Listed Above)			
Punching and Shearing	CYCLOPS 67 Water, Oil Hardening	S4-S5	C .55, Mn .90, Si 2.00, Mo .20	Water, Oil Mach. 90 Movement + C, + B
Punching and Shearing	VENANGO Oil Hardening	S2	C .50, Mn .45, Si 1.10, V .20, Mo .50	Oil Mach. 90 Movement + B
Punching and Shearing	(See DRACO, VENANGO SPECIAL, ORION, N-9, HERCULES, WANDO, ALCO M, ALCO S, SPARTA, ULTRADIE 1, ULTRADIE 2, ULTRADIE 3, MOTUNG P&D, Listed Above)			
Shock Resisting (Intermittent Impact)	(See ORION, N-9, DRACO, Listed Above)			
Shock Resisting (Repeated Impact)	(See CYCLOPS SPECIAL, CYCLOPS 67, VENANGO, VENANGO SPECIAL, N-9, ALCO M, ALCO S, Listed Above)			

VANADIUM-ALLOYS STEEL CO., Latrobe, Pa. (also Anchor Drawn Steel Co., Colonial Steel Co.)

Listing No. 65

Brick Mold Liners	CHROMEWEAR Air Hardening		C 2.30, Mn .70, Cr 5.25, W 1.10, Mo 1.10, V 4.75, Si .40	Air Mach. 40 Movement A
Cold Work Dies (Heading)	COLONIAL No. 14 Water Hardening	W1	C Opt., Mn .25, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Heading)	COLONIAL No. 7 Water Hardening	W2	C Opt., Mn .25, V .20, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Heading)	COLHED Water Hardening	W3	C 1.00, Mn .25, V .45, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Forming)	COLONIAL No. 4 Water Hardening	F2	C 1.30, Mn .25, W 3.50, Si .25	Water Mach. 45 Movement C
Cold Work Dies (Blanking, Forming)	AIR HARD Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25, Si .30	Air Mach. 85 Movement A
Cold Work Dies (Blanking, Forming)	COLONIAL No. 6 Oil Hardening	O1	C .95, Mn 1.20, Cr .50, W .50, V .20, Si .30	Oil Mach. 90 Movement A
Cold Work Dies (Blanking, Forming)	CROCAR Air, Oil Hardening	D4	C 2.20, Mn .20, Cr 12.00, V .10, Si .30, Mo .80	Oil, Air Mach. 40 Movement A
Cold Work Dies (Blanking, Forming)	OHIO DIE Air Hardening	D2	C 1.55, Mn .25, Cr 12.00, Mo .80, V .80, Si .38	Air Mach. 45 Movement A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Forming)	NEATRO Oil Hardening, High Speed	M4	C 1.27, Mn .25, Cr 4.50, W 5.50, Mo 4.50, V 4.00, Si .30	Oil Mach. 45 Movement A
Cold Work Dies (Lamination)	(See CROCAR, OHIO DIE, NEATRO, Listed Above)			
Cold Work Dies (Drawing)	(See COLONIAL No. 14, CROCAR, OHIO DIE, CHROMEWEAR, Listed Above)			
Cutting Tools (Roughing)	GRAY CUT COBALT Oil, Air Hardening, High Speed	T6	C .80, Mn .25, Cr 4.25, W 20.50, Mo .60, V 1.60, Co 12.25	Oil Mach. 45 Movement A
Cutting Tools (Roughing)	RED CUT COBALT Oil, Air Hardening, High Speed	T4	C .73, Mn .20, Cr 4.25, W 18.25, Mo .65, V 1.08, Co 4.75, Si .30	Oil Mach. 50 Movement A
Cutting Tools (Roughing)	RED CUT COBALT B Oil, Air Hardening, High Speed	T5	C .78, Mn .25, Cr 4.25, W 18.50, Mo .75, V 1.85, Co 8.75, Si .30	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	E.V.M. Oil, Air Hardening, High Speed	T2	C .85, Mn .25, Cr 4.25, W 18.10, V 2.00, Si .35	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	RED CUT SUPERIOR Oil, Air Hardening, High Speed	T1	C .72, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	VAN CUT Oil, Air Hardening, High Speed	M3	C 1.02, Mn .25, Cr 4.00, W 6.25, Mo 6.25, V 2.50, Si .30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	VAN-LOM Oil, Air Hardening, High Speed	M10	C .87, Mn .20, Cr 4.00, Mo 8.25, V 1.90, Si .30	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	VASCO SUPREME Oil, Air Hardening, High Speed	T15	C 1.57, Mn .25, Cr 4.75, W 12.50, V 5.00, Co 5.00, Si .25	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	VASCO SUPREME A Oil, Air Hardening, High Speed	M15	C 1.57, Mn .25, Cr 4.75, W 6.50, Mo 3.00, V 5.00, Co 5.00, Si .25	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	VASCO M-2 Oil, Air Hardening, High Speed	M2	C .84, Mn .25, Cr 4.20, W 6.35, Mo 5.00, V 1.90, Si .30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	S-N-2 Oil Hardening, High Speed	M1	C .81, Mn .25, Cr 3.80, W 1.60, Mo 8.70, V 1.15, Si .25	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	(See NEATRO, Listed Above)			
Cutting Tools (Drills)	(See VASCO M-2, Listed Above)			
Cutting Tools (Taps)	RED STAR TUNGSTEN Oil Hardening	O7	C 1.20, Mn .25, Cr .70, W 1.60, Mo .25, V .20, Si .30	Oil Mach. 90 Movement C
Cutting Tools (Taps)	(See VASCO M-2, RED CUT SUPERIOR, Listed Above)			
Cutting Tools (Thread Chasers)	(See VASCO M-2, RED CUT SUPERIOR, Listed Above)			
Diecasting Dies (Molds, Ejector Pins)	HOTFORM Air Hardening	H11, 12	C .35, Mn .30, Cr 5.00, W Opt., Mo 1.40, V .45, Si .90	Air Mach. 75 Movement A
Diecasting Dies (Trimming Dies)	(See COLONIAL No. 6, AIR HARD, OHIO DIE, CROCAR, Listed Above)			
Gages	(See COLONIAL No. 6, CROCAR, CHROMEWEAR, Listed Above)			
High Stress Machinery Parts	NIKRO M Oil Hardening	L6	C .70, Mn .55, Cr .85, Mo .25, Si .30, Ni 1.40	Oil Mach. 75 Movement A
High Stress Machinery Parts	VANADIUM Types D, G, H, K, N Water, Oil Hardening	L2	C Opt., Mn .20, Cr .80, V .20, Si .25	Water Mach. 90 Movement C
High Stress Machinery Parts	VANADIUM Type BB Water, Oil Hardening	L3	C 1.00, Mn .32, Cr 1.40, V .20, Si .25	Water Mach. 85 Movement C
Hot Work Dies (Hot Forming)	FORGE DIE Oil Hardening	H25	C .26, Mn .25, Cr 3.50, W 14.00, V .50, Si .25	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	HOTFORM No. 3 Air Hardening		C .55, Mn .30, Cr 5.00, W 1.20, Mo 1.25, Si .90	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming)	HOTPRESS Oil Hardening	H20	C .35, Mn .25, Cr 2.00, W 9.25, V .50, Si .25	Oil Mach. 60 Movement A
Hot Work Dies (Hot Forming)	JET FORGE Air Hardening		C .47, Mn .30, Cr 7.75, Mo 1.35, V 1.40, Si .90	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming)	MARVEL Oil Hardening	H21	C .33, Mn .20, Cr 3.50, W 9.75, V .45, Si .30	Oil Mach. 60 Movement A
Hot Work Dies (Hot Forming)	RED CUT SUPERIOR J Oil Hardening	H26	C .52, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .32	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	SC SPECIAL Oil Hardening	H21	C .49, Mn .30, Cr 3.00, W 14.50, V .50, Si .30	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	WCC Oil Hardening		C .40, Mn .30, Cr 4.25, W 4.25, Mo .40, Co 4.25, V 2.10, Si .30	Oil Mach. 75 Movement A
Hot Work Dies (Hot Forming)	WW HOTWORK Oil Hardening	H23	C .32, Mn .35, Cr 12.00, W 12.00, V 1.05, Si .50	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	(See HOTFORM, Listed Above)			
Hot Work Dies (Hot Punching & Shearing)	(See HOTFORM, MARVEL, Listed Above)			
Plastic Molding Dies (Machined Cavity)	MC Oil Hardening	P20	C .35, Mn .85, Cr .85, Mo .40, Si .40	Oil Mach. 85 Movement A
Plastic Molding Dies (Machined Cavity)	SPEED CUT Oil Hardening	P20	C .43, Mn .85, Cr 1.15, Mo .50, Si .30	Oil Mach. 140 Movement A
Plastic Molding Dies (Hubs)	PAR-EXC Oil Hardening	S1	C .53, Mn .20, Cr 1.65, W 2.00, V .25, Si .28	Oil Mach. 80 Movement A
Plastic Molding Dies (Hubs)	(See COLONIAL No. 6, AIR HARD, CROCAR, OHIO DIE, Listed Above)			
Plastic Molding Pins (Ejector Pins)	(See HOTFORM, Listed Above)			
Punching & Shearing	MOSIL Oil Hardening	S5	C .57, Mn .85, Cr .25, Mo .35, V .20, Si 1.90	Oil Mach. 85 Movement B
Punching & Shearing	SILMAN Water, Oil Hardening	S4	C .55, Mn .85, Cr .25, V .20, Si 2.00	Water Mach. 85 Movement C
Punching & Shearing	(See AIR HARD, COLONIAL No. 7, OHIO DIE, Listed Above)			
Shear Knives	(See AIR HARD, CROCAR, OHIO DIE, Listed Above)			
Shock Resisting (Intermittent & Repeated Impact)	(See SILMAN, MOSIL, PAR-EXC, COLONIAL No. 7, Listed Above)			
Thread Rolling	(See OHIO DIE, Listed Above)			

★ Last column indicates suggested Quenching Medium; Machinability Annealed, using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

VASCOLOY-RAMET CORP., 800 Market St., Waukegan, Ill. — Listing No. 66

Cutting Tools (Finishing, Cast Iron, Nonferrous)	2A7, Carbide
Cutting Tools (Finishing, Steel)	E, Carbide
Cutting Tools (General Purpose, Cast Iron, Nonferrous)	2A5, Carbide
Cutting Tools (General Purpose, Heavy Machining, Steel)	VR-75, Carbide
Cutting Tools (General Purpose, Steel)	EM, Carbide
Cutting Tools (Heavy Roughing and Interrupted Cuts, Cast Iron and Nonferrous)	2A3, Carbide
Cutting Tools (Heavy Roughing and Interrupted Cuts, Steel)	VR-77, Carbide
Cutting Tools (Hot Weld Flash Machining, Steel)	VR-87, Carbide
Cutting Tools (Light Roughing, Finishing, Steel)	VR-73, Carbide
Cutting Tools (Milling, Rotary Burring, etc., Cast Iron and Nonferrous)	VR-54, Carbide
Cutting Tools (Planing, Steel)	AW, Carbide
Cutting Tools (Precision Boring, Light Finishing, Steel)	EH, Carbide
Cutting Tools (Roughing and Finishing, Cast Iron and Steel)	TANTUNG, Cast Alloy
Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous)	2A6S, Carbide
Cutting Tools (Roughing Cuts, Steel)	EE, Carbide
Dies (Deep Drawing)	2A3, Carbide
Dies (Fine Wire Drawing)	2A6S, Carbide
Dies (Heading)	AX, Carbide
Dies (Heavy Duty Heading)	AY, Carbide
Dies (Wire Drawing)	2A6, Carbide
Mechanical Applications (Good Wear Resistance, Light Shock Resistance)	2A6S, Carbide
Mechanical Applications (High Wear Resistance)	2A5, Carbide
Mechanical Applications (High Oxidation and Corrosion Resistance)	TANTUNG, Cast Alloy
Mechanical Applications (Moderate Wear Resistance, High Shock Resistance)	2A3, Carbide
Mining Applications (Excellent Wear Resistance, Moderate Shock Resistance)	2A6, Carbide
Mining Applications (Good Wear Resistance, High Shock Resistance)	964S, Carbide
Mining Applications (Wear Resistance, Very High Shock Resistance, Geophysical Drilling)	9632, Carbide

WESSON CO., 1220 Woodward Heights Blvd., Detroit 20, Mich. — Listing No. 67

Cutting Tools (Heavy Rough Turning, Cast Iron, Nonferrous)	GS, Carbide
Cutting Tools (General Purpose Machining, Cast Iron, Nonferrous)	GI, Carbide
Cutting Tools (Finish Machining, Cast Iron, Nonferrous)	GA, Carbide
Cutting Tools (Precision Finishing, Cast Iron, Nonferrous)	GF, Carbide
Cutting Tools (Heavy Rough Turning, Forged, Rolled, Cast Steel)	WS, Carbide
Cutting Tools (General Purpose Machining, Steel)	WM 26, Carbide
Cutting Tools (Light Roughing, Finishing Steel)	WH, Carbide
Cutting Tools (Precision Finishing, Steel)	WH, Carbide
Cutting Tools (Heavy Duty Metal Cutting, Shock Resistance)	M, Carbide
Cutting Tools (High Velocity, Finishing Steel)	HV, Carbide
Cutting Tools (Rough Machining, Aluminum)	GS, Carbide
Cutting Tools (Finish Machining, Aluminum)	GI, Carbide
Mechanical Application (Extreme Wear Resistance)	GI, Carbide
Mechanical Application (Wear & Light Shock Resistance)	GS, Carbide
Mechanical Application (Wear & Heavy Shock Resistance)	M, Carbide

WILLEY'S CARBIDE TOOL CO., 1340 W. Vernor Highway, Detroit 1, Mich. — Listing No. 68

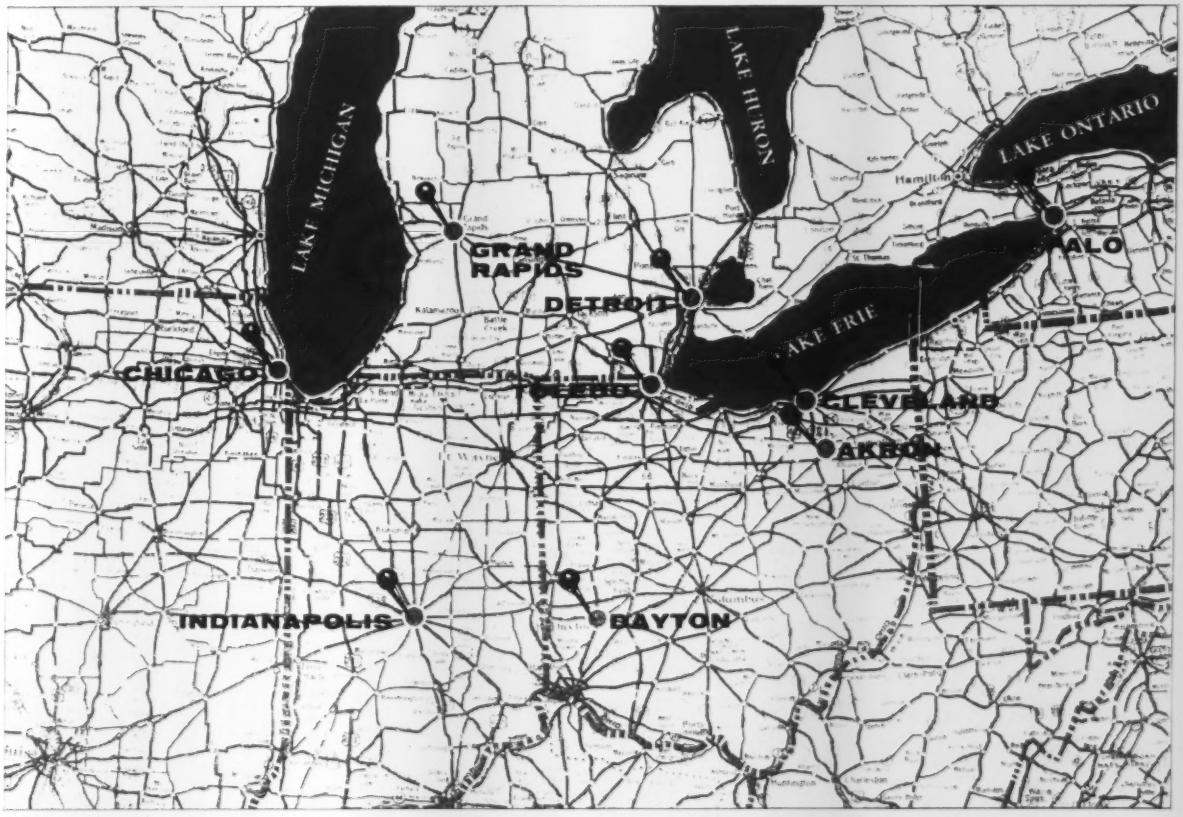
Cutting Tools (Chip Removal, Cast Iron, Nonferrous Roughing)	E-S, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous General Purpose)	E-6, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous Light Finishing)	E-5, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous Precision Finishing)	E-3, Carbide
Cutting Tools (Chip Removal, Steel, Roughing)	S-A, Carbide
Cutting Tools (Chip Removal, Steel, Heavy Duty Machining)	945, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose)	710, Carbide
Cutting Tools (Chip Removal, Steel, Finishing and Light Roughing)	606, Carbide
Cutting Tools (Chip Removal, Steel, Precision Finishing)	509, Carbide
Cutting Tools (High Speed Finishing)	6A, Carbide
Wear and Impact Applications (Light Impact, Extreme Wear Resistant)	E-13, Carbide
Wear and Impact Applications (Medium Impact, Wear Resistant)	E-18, Carbide
Wear and Impact Applications (Heavy Impact, Wear Resistant)	E-25, Carbide

ZIV STEEL & WIRE CO., 2945 W. Harrison St., Chicago 12, Ill. — Listing No. 69

Cold Work Dies (Blanking)	HARGUS Oil Hardening	O1	C .85-.95, Mn 1.00-1.25, Cr .50, W .50	Oil
Cold Work Dies (Forming, Punches, Rolls)	PRK-33 Air Hardening	D5	C 1.30-1.50, Mn .20-.30, Cr 12.50-14.50, Mo .65-.75, Co 3.00-3.50, Si .40-.65, Ni .50	Air
Cold Work Dies (Blanking, Forming)	NEOR Oil Hardening	D3	C 2.10-2.20, Mn .40-.60, Cr 12.75-13.75, Si .30-.60, Ni .50	Oil
Cold Work Dies (Rolls)	DUMORE Air Hardening	A2	C .95-1.05, Mn .50-.80, Cr 5.00-5.50, Mo .95-1.25	Air
Cold Work Dies (Blanking, Forming, Rolls, etc.)	LUBRI-DIE Oil Hardening	O6	C 1.35-1.50, Mn .40-1.00, Mo .20-.30, Si .75-1.25	Oil
Cold Work Dies (Blanking, Forming, Punches, Rolls, etc.)	DARWIN #1 Air Hardening	D2	C 1.50, Mn .35, Cr 11.00-13.00, Mo .75, Si .40, Ni .40, V .25	Air
Cutting Tools (Roughing and Finishing)	RED SHADOW High Speed	M2	C .75-.85, Cr 4.00-4.25, Mo 4.75-5.25, W 6.00-6.50, V 1.80-2.00 2.00	Oil or Air
Cutting Tools	SUPER HIGH SPEED Oil Hardening	T1	C .65-.75, Cr 3.50-4.50, W 17.50-19.00, V .90-1.20	Oil
Gages	(See NEOR, Listed Above)			
Hobs	WIZARD Oil Hardening	S1	C .40-.50, Mn .20-.40, Cr .85-.95, W .90-1.00, Mo .20	Oil
Hobbed Cavity Dies	HOB-A-DIE Oil Hardening	P2	C .06, Mn .30, Cr 1.00, Mo .25, Si .20	Oil
Hot Work Dies (Hammer, Upsetter, and Press)	H P.D. Oil or Air Hardening	H12	C .35, Cr 5.15, Mo 1.55, Si 1.05, W 1.25, V .30	Oil or Air
Hot Work Dies (Diecasting)	MAXIMOLD	H13	C .35-.45, Cr 5.10-5.35, Mo 1.10-1.25, Si .95-1.05, V .95-1.10	Oil or Air
Hot Work Dies (Hammer)	TYPLEX Air Hardening		C .35-.45, Mn .25-.50, Cr 1.25-1.75, Mo .60-.90, Ni 4.00-4.50	Air
Hot Work Dies (Upsetter, and Press)	(See TYPLEX, Listed Above)			
Machinery Parts	ZIVAN-45 Oil Hardening		C .40-.50, Mn .60-.90, Cr .80-1.10, V .15 min.	Oil
Punching and Shearing	(See DUMORE, Listed Above)			
Punching and Shearing	PLANCHER Oil Hardening	S5	C .55-.65, Mn .70-.90, Si 1.85-2.10, Mo .40-.50	Oil
Shock Resisting	(See WIZARD, Listed Above)			

PENINSULAR'S Team of
9 Steel Service Centers
working together to give you
STEEL plus SERVICE

America's Largest Independent Tool Steel Distributor



TOOL STEELS • ALLOYS • COLD DRAWN • HOLLOBAR

FLAT GROUND STOCK • DRILL ROD • PLATE

Over 40 Years of Service to Industry

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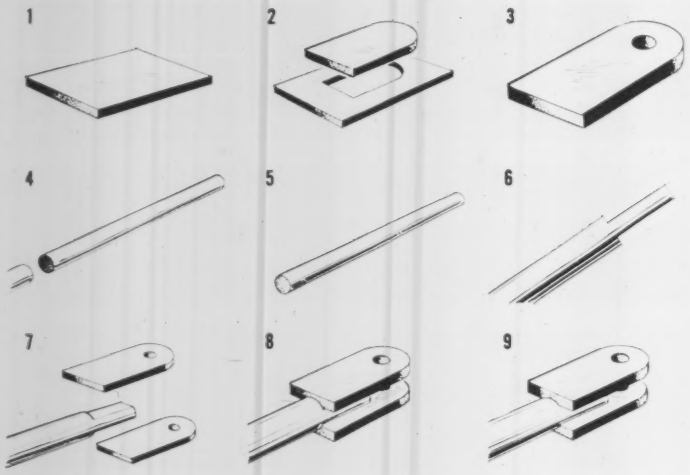
OLD METHOD



1. Machine.
2. Stamp.
3. Drill side plates.
4. Cut rod to length.
5. Drill two holes.
6. Machine flats.
7. Assemble side plates.
8. Silver braze.
9. Ream holes (to correct warp).

Cost per machine (ten required) $6.56

COST CRISIS . . . How To Beat It

Welded Fastener Cuts Cost

Unusual adaptation of a standard part substituted resistance welding for hand silver brazing. Operations dropped from nine to four. Parts cost dropped from 12 to under 2 cents

COST CRISIS COMPETITION

This article is part of a campaign to help industry achieve lower unit production costs. The accompanying example and others to follow are samples of what the editors of STEEL are looking for in their nationwide search for companies that have brought about important cost savings through more efficient use of capital equipment. Does your company qualify? If so, enter the Cost Crisis Competition. Write to the Cost Crisis Editor, STEEL, Penton Bldg., Cleveland 13, Ohio, for your awards kit.

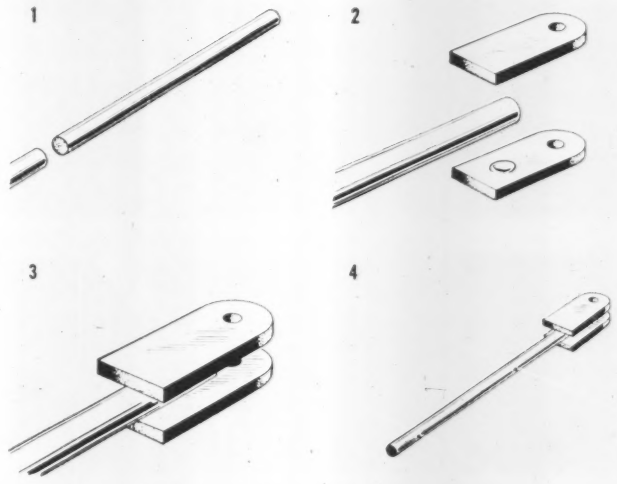
WELDED fasteners offer an effective way of lowering the costs of drilling, tapping, and similar machining operations.

American Machine & Foundry Co., Buffalo, saved $34,675 the first year it switched from hand silver brazing to projection spotwelding. (The firm makes an automatic bowling pinspotter.)

Operation—An AMF pinspotter has seven pin stations. Each is moved by a pin elevator pusher rod connected (like spokes on a wheel) to a roller bearing that rides a large cam. Three more pusher rods operate other parts.

One end of each rod has a yoke that resembles a clevis. AMF used to machine flats on the rod and silver braze small side plates to the flats. Machining blanking stock, stamping, drilling, and assembly to the rod took nine operations. Quality was hard to maintain because of warping.

NEW METHOD



1. Cut rod to length.
2. Assemble weld fastener to rod in fixture.
3. Resistance weld.
4. Drill two holes, locating from weld fastener.

Cost per machine (ten required) $1.906

SAVED:

Per machine	$4.654
Yearly (7500 machines)	$34,905.00
*Tooling costs	$230.00
Net Yearly Saving	$34,675.00

*Share of machine burden not included.

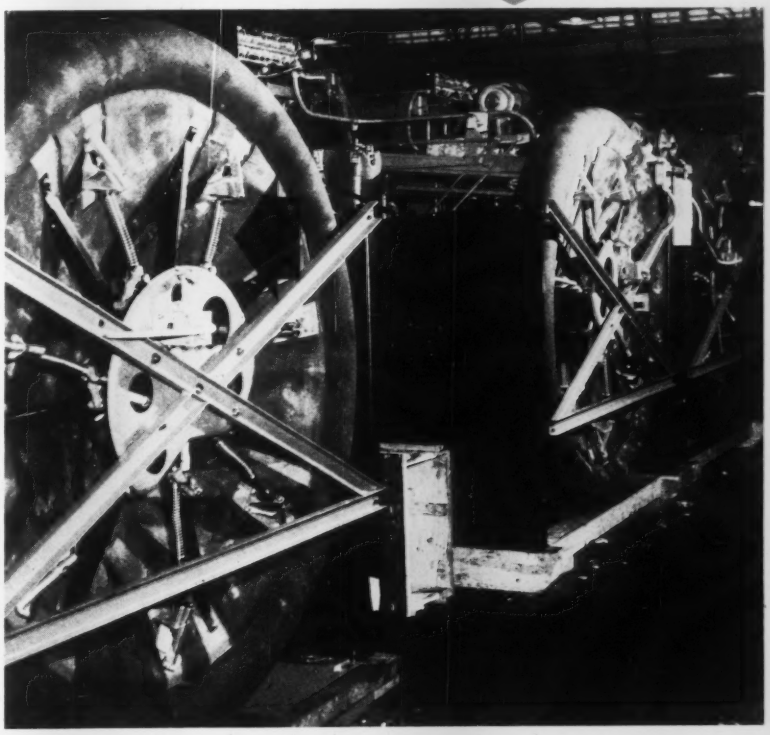
# of Machine

Idea — AMF engineers decided that its side plates could be spot or resistance welded to the rod in a standard machine. After a tryout, they took it another step: With the help of the Ohio Nut & Bolt Co., Cleveland, they selected a standard projection weld fastener which eliminated the need for machining flats on the rod.

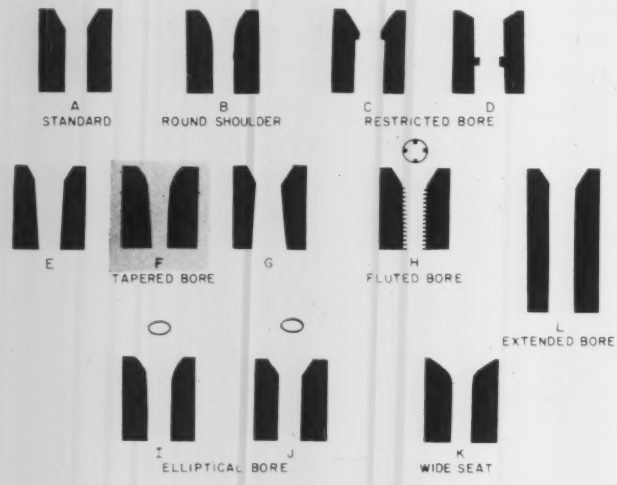
The moves cut operations from nine to four, saving $4.654 on each pinspotter.

Easily Bypassed—Such changes are deceptively simple. Ohio Nut & Bolt says it handles a similar case every week. A maker of power mowers netted $12,000 in one year by joining its handles to frames with weld fasteners.

Many firms find them an economical substitute for much heavier parts. A side benefit: Changeovers are a lot less expensive than those which require machining and fixturing changes.



Here's the working end of an AMF automatic pinspotter. Solid green arrow shows the location of one of ten pusher rods connecting cam and pin lifter



U. S. Steel studied nozzles in all these shapes

Nozzle Changes Pay Off

Success of the steel pouring operation, right down to the quality of finished steel, depends on the quality of these fireclay parts. Model tests proved in production

FOR THEIR SIZE, pouring nozzles carry a lot of weight around a steel mill. Three papers were devoted to them at a meeting of the National Open Hearth Steel Committee of the AIME at Cleveland, Apr. 14-16.

Nozzle materials, shape, refractoriness, quality, size, and the effects of these variables on ingots and the steels rolled from them were under scrutiny.

Model Studies—U. S. Steel has been looking at nozzle design and refractoriness. R. E. Stoll, general supervisor-metals research, and E. C. Rudolphy, chief development metallurgist, South Works, described how they used transparent plastic models and high speed photography to determine the effects of nozzle shape. (Their paper: "Effect of Nozzle Characteristics on Steel Pouring Streams.")

They found that a nozzle with a tapered bore, small end down, produced a stream with the least flare and turbulence. (See drawing.)

Experimental results were verified with production trials, and the tapered bore nozzles have since become the standard for all basket pouring at South Works.

Scaling the Model—One caution on model studies: The model must simulate production conditions as closely as possible, which means that principles of dynamic similarity must be followed in designing it. Applying these principles to models of pouring ladles and nozzles, the authors were able to use water as the test fluid and get the same type reaction they did with liquid steel in the production cross-check.

The transparent model was especially valuable in revealing stream conditions within the nozzle. Observers could see how (and why) changes in nozzle bore affected the turbulence of the stream.

Proof in Practice—What the models couldn't show were operating problems like bore buildup, chilling, and plugging. But production trials definitely showed that the tapered nozzles caused less buildup and were easier to open and keep open than straight bore nozzles.

The pouring rate of the tapered nozzles turned out to be faster and more uniform throughout a pour. By making slight adjustments in the diameters of the seat and orifice, it proved possible to get any desired pouring rate and still keep the other good features of the nozzle.

Refractoriness — This property has a good deal to do with the pouring rate and cleanliness of the steel. Three levels of refractoriness were chosen for experimental fireclay nozzles: Low, softening point 2715° F (pyrometric cone equivalent 16); intermediate, 2920° F (PCE 23); and high, 3020° F (PCE 29). The intermediate (PCE 23) nozzles performed best. Their softening point is in the normal temperature range encountered in steel pouring, so that any erosion turned out to be just about balanced by metal buildup.

The PCE 16 nozzles eroded excessively. The PCE 29 nozzles tended to chill the steel and developed heavy buildups of cold metal and slag that had to be burned out with oxygen. Recommendation: That fireclay nozzles be between PCE 16 and 23, with the high side of the range preferred.

Slab Quality—Inland Steel Co., East Chicago, Ind., has been looking at nozzles from the point of view of the end product—surface quality of low carbon rimming steel. Since ingot characteristics influence the quality of intermediate slabs and finished products, it seemed logical to carry an investigation back to the pouring pit.

Evidence suggested that slowly poured ingots required the most conditioning, but the more gener-

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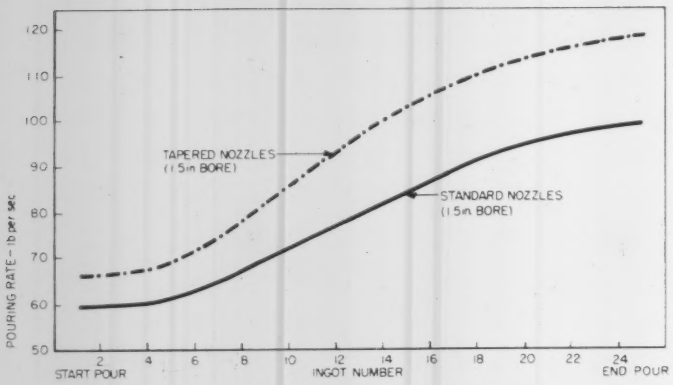
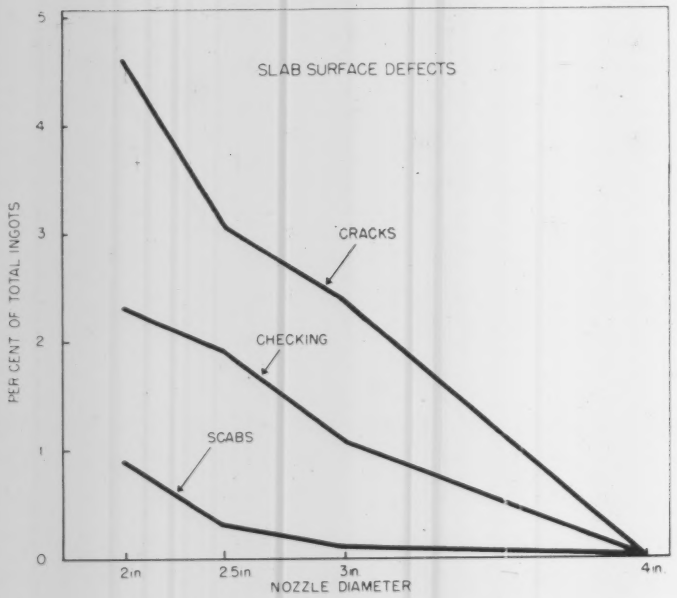


Tapered nozzles speeded up the pouring rate



Inland showed larger nozzle sizes produced fewer slab surface defects

ally held view was that fast pouring promotes ingot cracks and suppresses gas evolution. A. T. Peters, metallurgist at Inland, reported a study aimed at resolving the conflict. (His paper: "Effect of Nozzle Size on Pouring Rates and Slab Surface of Rimming Steels.")

Bigger Bores—Inland had been using nozzles with a 2-in. bore as standard for pouring low carbon rimming steels. Tests were made on nearly 11,000 ingots, comparing 25 per cent alumina fireclay nozzles with 2, 2½, 3, and 4 in. bores. Slab quality was decided by visual inspection at the blooming mill just before machine scarfing.

The bigger nozzles resulted in better slabs. Fewer ingots rated "poor" for surface cracks, checks, and scabs when the 3 and 4 in. nozzles were used. Inland has since adopted the 3 in. nozzles for production pouring of low carbon rimmed steels from 175 and 205 ton ladles.

Pour Control—The investigators recognized that both ferrostatic pressure and nozzle bore erosion influenced the pouring rate. Nothing much could be done about ferrostatic pressure in the type of pouring being studied, and merely increasing nozzle bore size did not produce a uniform change in pouring rate.

Starting with a 2-in. nozzle, the rate of pour rose in a gentle curve to the middle of a pour, then fell off in the same fashion. Larger nozzles (3 and 4 in.) showed a gradual decline in pouring rate to the middle of the pour, followed by a steep falling off. The uniformly dropping pouring rate of the 3-in. nozzles proved to be more predictable and easier to control than the others—an important point when automatic equipment is used to feed aluminum to the ingot.

Quality Counts—But all the standards for size, shape, and refractoriness go for nothing if users don't keep a close watch on the quality of nozzles they buy. C. L. Meloy, ceramics engineer, research department, Bethlehem Steel Co., Bethlehem, Pa., passed some of his company's suggestions along to the AIME group. His paper: ("Quality Control of Pouring Aisle Refractories.")

The best way to improve pit refractories, he said, is to strive for uniformity in physical and chemical properties. The operator who handles refractories should be alert to any change. The ceramic engineer must be ready to explain these and help the operator find ways to maintain uninterrupted operation.

Close Check—At Bethlehem, a new shipment of nozzles is thoroughly sampled: They are inspected for color, cracks, chips, general workmanship, size, fit, and seating of the stopper head.

Nozzles and sleeves are marked with the date of manufacture, and operators are encouraged to use up a lot marked with one date before starting on the next.

The laboratory tests are destructive: Refractoriness, porosity, bulk density, chemical analysis, modulus of rupture. Results are plotted by standard quality control methods to show the deviation from established norms. When a shipment falls below average, it may be rejected. It is also an open invitation to competitors.

INTRODUCING

KENNETH E SOLOMON

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THE KENJO COMPANY will represent Bigelow-Liptak for the steel and glass industries in seven states — New York, Pennsylvania, Ohio, West Virginia, Maryland, Delaware and New Jersey.

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Both Ken Solomon and Joe Ilik are well-known figures in the steel and glass industries. They have organized a new company – the Kenjo Company – which will represent Bigelow-Liptak Corporation in these industries.

The Kenjo Company will be responsible for selling and servicing Bigelow-Liptak refractory installations for open hearths, uptakes, chill walls and checker chambers plus billet, slab and normalizing furnaces. Refractory applications in the glass industry include glass shadow walls and many others. Be sure to contact Ken or Joe if you need help.

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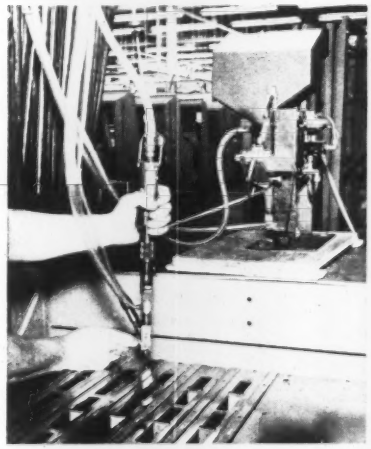
Cuts Assembly Time

Automatic fastener equipment boosts production efficiency, lowers operator fatigue

ASSEMBLY line production efficiency has been improved by automatic fastening equipment at International Business Machines Corp.'s Kingston, N. Y., plant.

The company reports that assembly time of top plates and panels to computer frames has been reduced about 30 per cent by Jet-Setter screw feeding equipment manufactured by Parker-Kalon Div., General American Transportation Corp., Clifton, N. J.



SCREW FEEDER
. . . eliminates hand starting

Method—Screws are started and driven in a single operation; the operator can reach any point along the 6 ft length of the computer frame. Pneumatic controls allow only one screw at a time to be fed from a hopper to the Ingersoll-Rand driver. The screw is held in driving position where it acts as a finder of drift.

Additional savings: Less operator fatigue and virtual elimination of fastener losses.

Reactor Material Talks Set

New York University will offer a one-week course on materials for nuclear reactors June 9-13. Designed for people with metallurgical or general engineering backgrounds, it includes a series of 20 lectures by nuclear authorities.

Showing Off Precision

Industry representatives go to a capital equipment builder's plant to talk over problems. One item that caught their attention: A new system for printing gaging results

ONE WAY to capture a market is to establish your reputation as an authority. Here's an example of what you can do.

Sheffield Corp., Dayton, Ohio, has already made more than a good impression on the industry that makes pernickety servovalves, but management wants the company to become known as a single source of knowhow for its customers' problems.

As part of its program, Sheffield recently invited representatives of every servomaker in the country to a "Servovalve Seminar" at Dayton. More than 130 responded.

Match Grinding—The sessions reminded guests that the close precision called for in servos is bread-and-butter business at Sheffield.

The company also showed off its solution to the knottiest problem in servomaking: Matching ports on the cylinder to the lands on a piston.

The answer: Drill the holes on Sheffield's ultrasonic Cavitron machine, then grind the lands by matching them optically to the cylinder ports. The operator uses a pair of microscopes to line up a piston in the grinding station with a cylinder positioned on the machine worktable. In essence, he positions lands on the piston by sighting through the cylinder ports.

Proof of Quality

Suppose you want to keep records of measurements on parts you make as an aid to your quality control system, or as a record to show your customer that his specifications have been met.

Sheffield engineers showed the precision-minded servomakers a newly developed technique for automatically recording measurements.

Called a "print-out" system, it automatically records deviations from nominal size measured by single or multiple gage points.

The system demonstrated at the seminar will be exhibited at the Tool Show in Philadelphia, May 1 through May 8. It uses air gage probes to measure the inside and outside radiuses of a cone, records the measurements on a tape, then computes and records the difference (wall thickness).

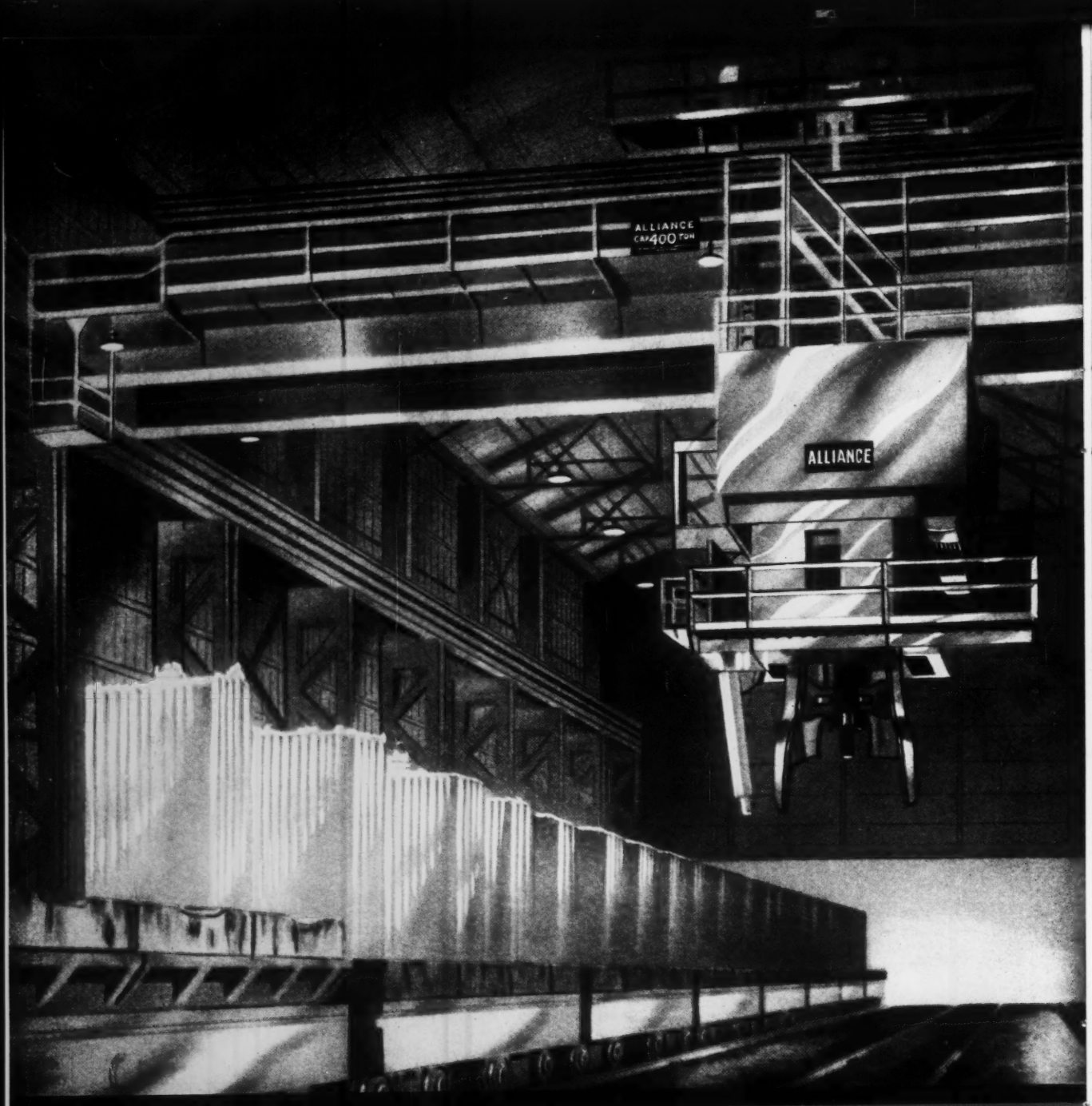
Also shown—a portable Monitorecord instrument that measures and tape records the split-second timing of electrical control circuits on complex automatic equipment.

The Slump: How Long?

Despite reports that the capital equipment business is picking up, it is still bad and prospects for an early revival are poor. That's the consensus of more than a dozen major machine tool builders queried by STEEL.

Not one of the builders expects an honest-to-goodness upturn until early 1959. One figures it could come as late as 1961. The builders can find no apparent reason for an earlier turn: Defense contracts hold small promise (particularly in missiles); automakers already have too much capacity. Capital equipment makers are too many steps removed from the consumer to benefit quickly even if consumer spending jumps tomorrow.

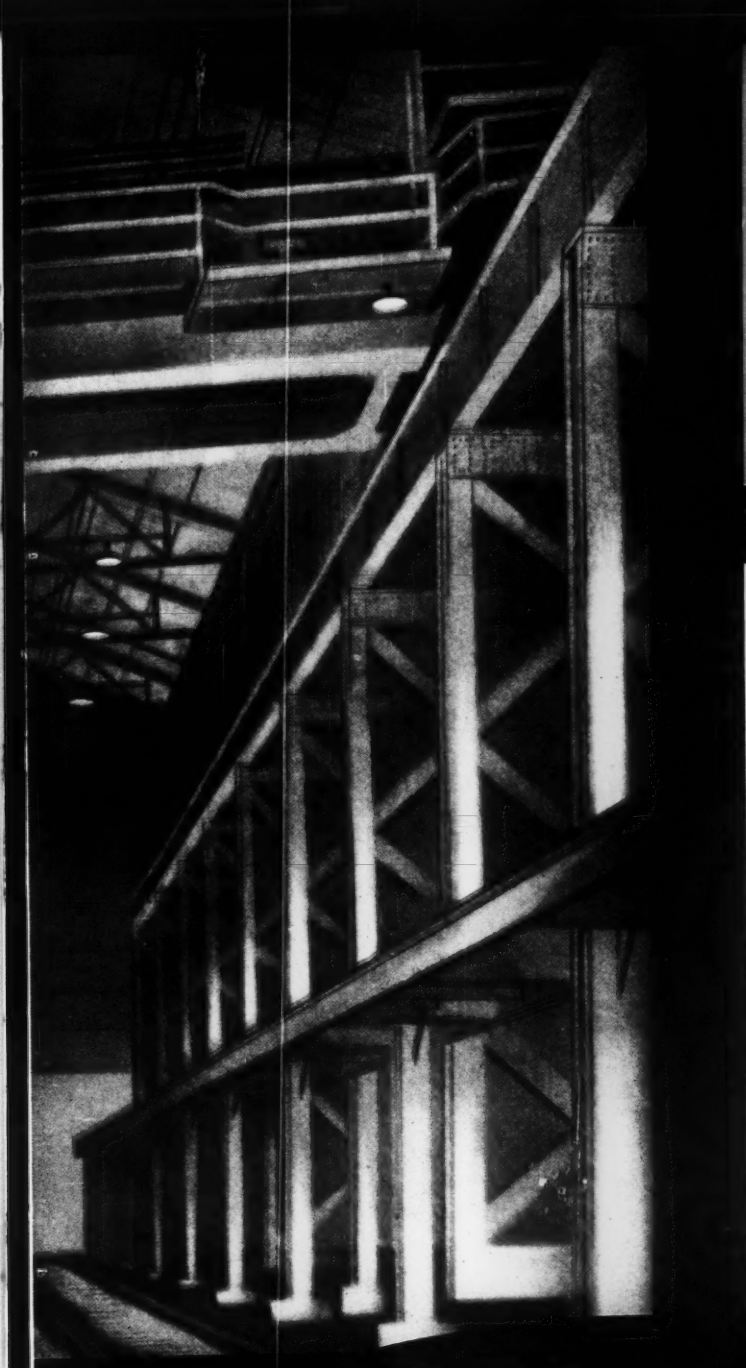
A New England builder put it this way: "Sure, last month the industry sold more than it did the month before. It could hardly have sold less. Our sales figures are going to bounce along this bottom for some time yet. Shipments will continue to be trimmed until they are roughly equal to orders. One thing is sure: We'll all be ready and waiting for the inevitable boom."



THE WORLD'S LARGEST STRIPPER CRANE

• This 400-ton Alliance push-pull Stripper Crane is the world's largest. It can exert 2,400,000 pounds' pressure to strip moulds from ingots — cleanly and safely. The patented Impact Stool Loosener speeds up the stripping operation. The stripping mechanization has a nominal rating of 400 tons but is designed to stand forces of 1200 tons. Its many exclusive design features are a result of Alliance's knowledge of mill problems and requirements. They design the world's biggest cranes, manipulators and special machinery. Their experience assures you the best in modern design. A letter, wire or phone call will put your problems into the hands of The World's Largest Builders of the World's Largest Cranes.

THE ALLIANCE MACHINE COMPANY



EXCLUSIVE with ALLIANCE

The Alliance Impact Stool Loosener makes your stripper crane more useful, more efficient and saves wear and tear on the crane and ingot buggies. The Impact Stool Loosener can be installed on most stripper cranes now in your service.

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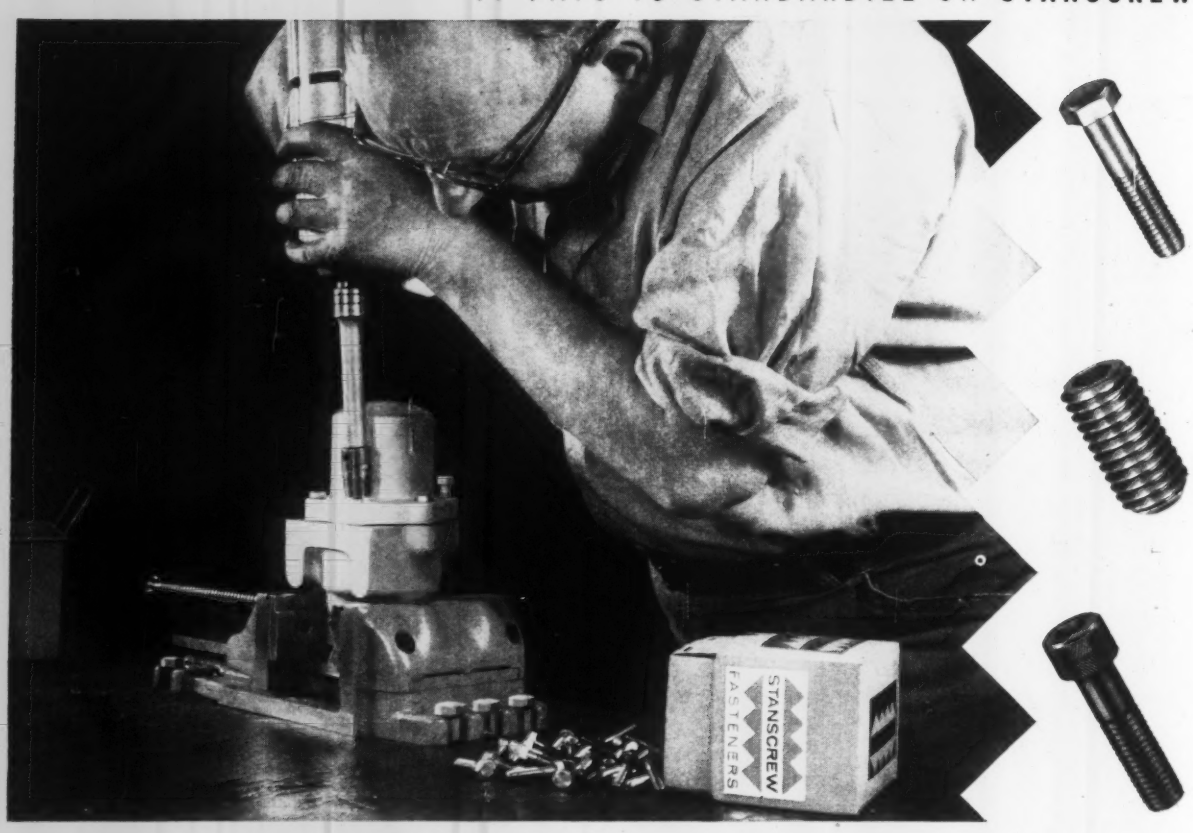
IT PAYS TO STANDARDIZE ON **STANSCREW**



Stanscrew service cuts rejects, speeds assembly for valve manufacturer

A prominent manufacturer of 4-way valves for freon was having trouble on his assembly line. His fasteners, tightened to an extreme degree to prevent seepage of the gas, were breaking on too many occasions. This meant complications in assembly and a high reject rate—which increased production costs substantially.

One of Stanscrew's fastener specialists, called in by a Stanscrew distributor, quickly found the answer. He recommended a standard cap screw and had staff engineers work out the precise torque which should be applied to insure a complete seal at all gaskets, yet eliminate any possibility of fastener breakage. By following these recommendations, the manufacturer has eliminated the problem of fastener breakage, and substantially reduced his reject rate.

Stanscrew offers over 4,000 standard fasteners . . . including a complete selection of socket, set, and cap screws. All are produced under rigid quality control methods and incorporate the lessons learned during 85 years of fastener manufacture. All 4,000 are always in stock and quickly available.

For the answer to your fastener problem, call your Stanscrew distributor. He will have a Stanscrew fastener specialist promptly study your operation and make specific recommendations.

STANSCREW FASTENERS

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HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

26th ANNUAL MEETING

and 1958 Tool Show

American Society of Tool Engineers

"Tooling for Competition" is the theme of the show and meeting at Philadelphia's Convention Center May 1 through May 8. Highlights include 44 technical conferences in which more than 100 industry experts will participate; 500 exhibitors displaying $10 million of equipment; the first metal cutting review seminar (May 1 and 2); and tours to manufacturing plants in the Philadelphia area. The tool show will be open to visitors from 9 a.m. to 6 p.m., except Sunday, May 4, when it will be closed.

TECHNICAL CONFERENCES

Thursday, May 1

3 p.m.

TOOL ENGINEERING FOR AIRCRAFT PRODUCTION

(Ballroom, Convention Center)

"Magnesium in Aircraft Tooling," Karl F. Melde, Boeing Airplane Co.

"A Tool Engineer's Approach to the B-58 Weapon System," Ralph A. Fuhrer, Convair Div., General Dynamics Corp.

8 p.m.

TOOL ENGINEERING FOR AIRCRAFT PRODUCTION

(North Garden, Bellevue-Stratford Hotel)

"Weight Savings in the Manufacture of Aircraft Engine and Missile Parts by Cold Roll Forming from Thick to Thin Material," Arthur A. Merry and John G. Campbell, Pratt & Whitney Div., United Aircraft Corp.

"Safety Engineering as a Function of Human Engineering," Max A. Pape, Missile Systems Div., Lockheed Aircraft Corp., R. W. Faubion, North American Aviation, and Nikki Kaye, Kaye-Pape Associates.

Friday, May 2

9:30 a.m.

PLASTIC TOOLING

(Room 200, Convention Center)

"For Tools and Dies—New Epoxy-Fiber Compositions," A. P. Mazzucchelli, Bakelite Co., division of Union Carbide Corp.

"Our Experience in the Use of Plastic for Making of Duplicate Die Models, Engineering Checking Fixtures, and Prototype Tools," A. E. Vallier and H. L. Wyatt, Ford Motor Co.

"Shell Molding and Tool Engineering," Otto W. Winter, Beardsley & Piper Div., Pettibone Mulliken Corp.

9:45 a.m.

STEEL—FORGINGS AND EXTRUSIONS

(Ballroom, Convention Center)

"Steel Forgings, Why and How," A. O. Schaefer, Pencoyd Steel & Forge Corp.

"Design Features and Cost Benefits of Hot Extruded and Cold Drawn Steel," R. L. Hugo, Jones & Laughlin Steel Corp.

2 p.m.

NUCLEAR ENGINEERING

(Ballroom, Convention Center)

"Standardization in the Nuclear Industry," Dr. Henry H. Hausner, Penn-Texas Corp.

"Unique Aspects of Nuclear Component Manufacture," H. C. Amtsberg, Westinghouse Electric Corp.

2:30 p.m.

CUTTING TOOLS

(Room 200, Convention Center)

"Tool Steel Toughness—Rated by a New Method of Measurement," Gary Steven, A. E. Nehrenberg, and V. D. Chandhok, Crucible Steel Co. of America.

"Basic Developments in Carbide Tooling," W. L. Kennicott, Kennametal Inc.

8 p.m.

CERAMIC TOOLS

(Burgundy Room, Bellevue-Stratford Hotel)

"New Developments in High Velocity Machining," Wallace B. Kennedy, Ordnance Corps, Watertown Arsenal.

"Characteristics and Experimental Performance of Certain New Ceramic Tool Compositions," A. G. King and W. M. Wheildon, Norton Co.

8:15 p.m.

TOOL ENGINEERING RESEARCH

(Oak Room, Bellevue-Stratford Hotel)

"Role of Research and Development in Gear and Spline Production Equipment," Richard S. Hildreth, Michigan Tool Co.

"Research Report on High-Speed Circular Sawing of Aluminum Alloys," O. H. Nuss, DeWalt Div., American Machine & Foundry Co.

Saturday, May 3

9:45 a.m.

GENERAL TOOL ENGINEERING

(South Garden, Bellevue-Stratford Hotel)

"Static Switching for the Mechanical Engineer," Arthur H. Wolfson, Gage Div., Pratt & Whitney Inc.

"Vitrifiable Silicate Tooling for High Temperature Plastics," J. D. Stillman, Convair Div., General Dynamics Corp.

10 a.m.

METAL CUTTING RESEARCH

(North Garden, Bellevue-Stratford Hotel)

"Mechanism of Chip Formation in Metal Cutting," and "Some Thermal and Physical Aspects of Metal Cutting," Dr. Donald N. Gideon, Dr. Ralph Simon, and Dr. Horace J. Grover, Battelle Memorial Institute.

1:30 p.m.

SURFACE FINISHES

(South Garden, Bellevue-Stratford Hotel)

"Gear Tooth Honing—a New Approach to Improving Gear Surface Finish," B. F. Bregi, National Broach & Machine Co.

"Obtaining Specified Finishes by Honing," B. R. McConnell Sr., Sunnen Products Co.

2 p.m.

METAL CUTTING RESEARCH

(South Garden, Bellevue-Stratford Hotel)

"Present Knowledge of Cutting Fluids," S. L. Cosgrove and Roy W. Greenlee, Battelle Memorial Institute.

"Influence of Metallurgical Properties on Metal Cutting Operations," Francis W. Boulger, Battelle Memorial Institute.

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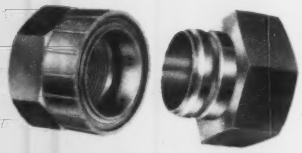
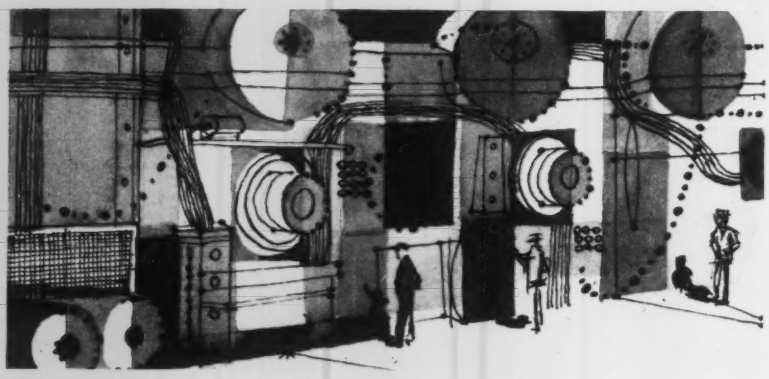
Roylyn

ALL PURPOSE

INDUSTRIAL COUPLINGS

OPEN COUPLINGS





COMPARE . . . TEST . . .
THEN USE THE BEST

- Quick Connecting
- Full Flow
- Ease of Operation
- Positive Lock
- Increased Efficiency
- Minimum Maintenance
- Maximum Efficiency
- Rugged Construction

. . . all adding up to "down-time" cut in half and production schedules met with half the effort.

CUT "DOWN-TIME" IN HALF

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With every roll change . . . the nation's steel, tin, aluminum, paper and allied mills are saving up to 60 man-minutes with every roll change . . . a saving of thousands of dollars made possible with Roylyn Industrial Couplings!

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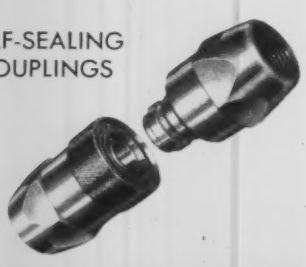

The Best Connections in the World

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ASTE MEETING . . .

8 p.m.

GENERAL TOOL ENGINEERING
(South Garden, Bellevue-Stratford Hotel)

"New Manufacturing Techniques for Hydraulic Servovalves," Edgar M. Hakanson, Machine Tool Div., Sheffield Corp.

"The Use of Ultrahigh Speed, 150 Horsepower Lathe for Machinability Studies," H. J. Siekmann, Mefallurgical Products Dept., General Electric Co.

8:30 p.m.

METAL CUTTING RESEARCH PANEL
(Rose Garden, Bellevue-Stratford Hotel)

Five papers and a panel discussion in which the audience may participate.

Chairman: Francis W. Boulger, Battelle Memorial Institute.

Panel Members: Professor L. V. Colwell, University of Michigan; E. L. Fowler, International Nickel Co. Inc.; R. E. McKee, R. K. Leßlond Machine Tool Co.; Prof. Kenneth J. Trigger, University of Illinois; and Norman Zlatin, Metcut Research Associates.

Monday, May 5

9:30 a.m.

NUMERICAL CONTROL SYMPOSIUM
(Ballroom, Convention Center)

"Numerical Control: Facts and Fallacies," T. W. Black, *Tool Engineer*.

"Numerical Control," R. V. Benaglio, Bendix Aviation Corp.

9:45 a.m.

TOOL ENGINEERING RESEARCH
(Room 300, Convention Center)

"A New Approach to Some Relationships in the Theory of Metal Cutting," Dr. Max Kronenberg, consulting engineer.

"Machine Tool Dynamometers, Their Design and Application," Erik K. Henriksen, Convair Div., General Dynamics Corp.

10 a.m.

GENERAL TOOL ENGINEERING
(Room 200, Convention Center)

"Automatic Size Control for Centerless Grinders," Arthur Parnes, Airborne Instruments Laboratory Inc.

"The Significance of the Surface Finish Produced by Electrodischarge Machining," Charles H. Good, Micrometrical Development Corp.

1:30 p.m.

NUMERICAL CONTROL SYMPOSIUM
(Ballroom, Convention Center)

"Machine Tool as the Controlled Element," J. R. Ballinger, Bendix Aviation Corp.

"Potential of Numerical Control in Manufacturing Operations," L. S. Peck, North American Aviation Inc.

2 p.m.

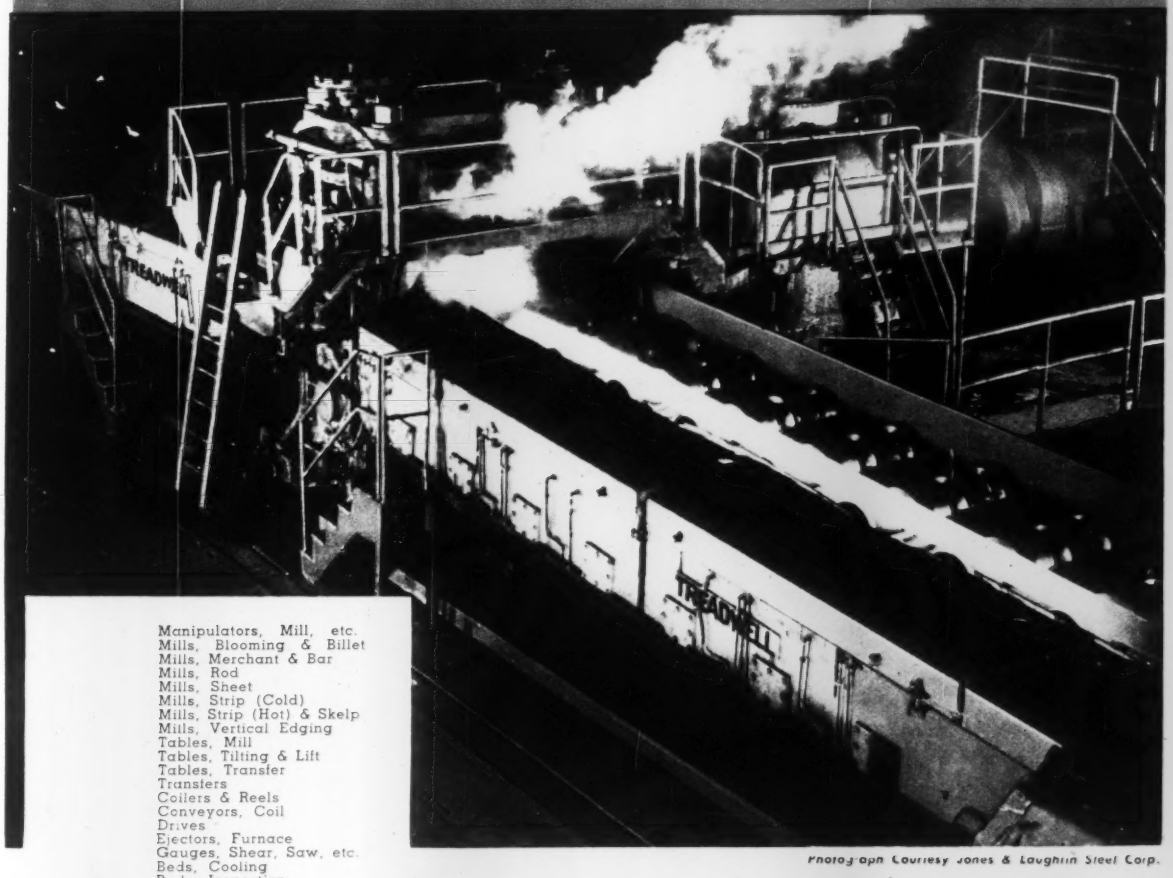
DIAMOND TOOLS
(Room 300, Convention Center)

"Oriented Diamonds in Connection with Single-Point Tool Applications," J. B. Speirs, American Coldset Corp.

"Proper Grain Orientation Improves Diamond Cutting Tool Life," Jan Taeyaerts, Precision Diamond Tool Co.

(*Please turn to Page* 156)

Treadwell



Photograph Courtesy Jones & Laughlin Steel Corp.

Manipulators, Mill, etc.
Mills, Blooming & Billet
Mills, Merchant & Bar
Mills, Rod
Mills, Sheet
Mills, Strip (Cold)
Mills, Strip (Hot) & Skelp
Mills, Vertical Edging
Tables, Mill
Tables, Tilting & Lift
Tables, Transfer
Transfers
Coilers & Reels
Conveyors, Coil
Drives
Ejectors, Furnace
Gauges, Shear, Saw, etc.
Beds, Cooling
Beds, Inspection
Bumpers, Furnace
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Repeaters
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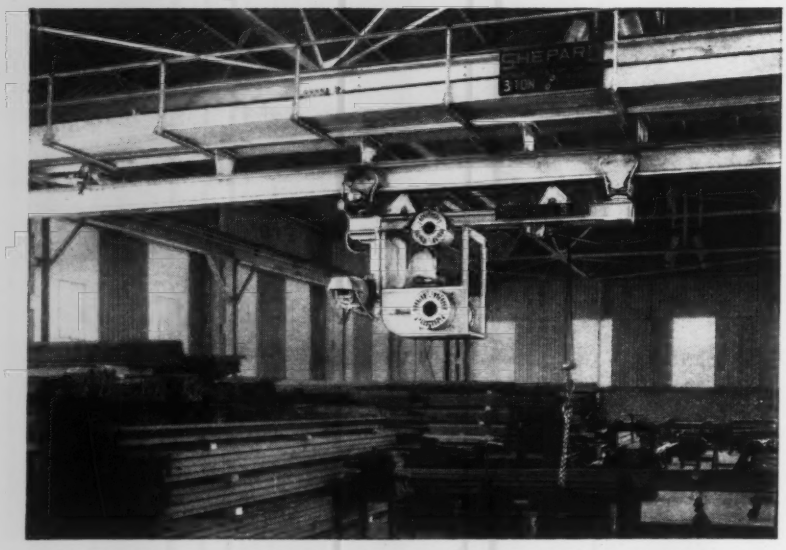

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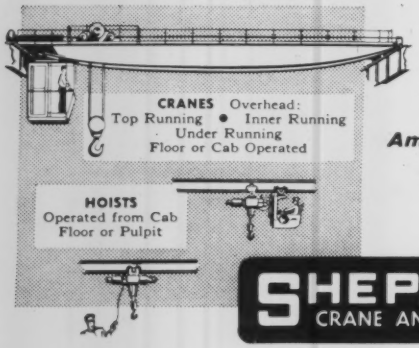
Rugged Shepard Niles hoists are available for constant or intermittent service. Choose from light, medium or heavy duty hoists equipped with cab or floor controls. Offered in fast, medium or slow speeds. Send for Monorail Hoist bulletin today . . . or ask that a Shepard Niles representative call — there's NO OBLIGATION.



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ASTE MEETING . . .

Tuesday, May 6

9:30 a.m.

NUMERICAL CONTROL SYMPOSIUM
(Ballroom, Convention Center)

"Numerical Control for Templates and Dies," Dr. Darwin H. Bingham Jr., Giddings & Lewis Machine Tool Co.

"Production Experience on Numerically Controlled Machine Tools," F. Booth, Bendix Aviation Corp.

9:30 a.m.

METAL POWDER PARTS SYMPOSIUM
(South Garden, Bellevue-Stratford Hotel)

"The Effects of Structural Part Design on Tooling for Sintered Metals Fabrication," Frank J. Demaine, International Business Machines Corp.

"Process Selection and Economics," Prof. Gregory J. Comstock, Stevens Institute of Technology.

9:45 a.m.

DIAMOND TOOLS
(Room 300, Convention Center)

"Oriented Diamonds Give Maximum Performance in Formed Dressing Tools," Joseph Klipper, Clipper Diamond Tool Co. Inc.

"The Oriented Vector in Diamond Dressing Tools," Harold C. Miller, Super-Cut Inc.

10 a.m.

NEW DRILLING TECHNIQUES
(Room 200, Convention Center)

"The Spiral Point Drill—A Self-Centering Drill Point Geometry," Hans Ernst and W. A. Haggerty, Cincinnati Milling Machine Co.

"Production Drilling and Reaming of Precision Holes with Gun-Type Tools," Herbert Gregg, Star Cutter Co.

3 p.m.

DIAMOND TOOLS
(Room 300, Convention Center)

"A Rapid Method for Setting Oriented Diamonds in Tools," R. G. Weavind, C. J. Guykers, and A. R. Roy, Crown Mines.

"The Orientation of Diamonds for Tools by Means of an X-Ray Image Intensifier Tube," Dr. J. F. H. Custers, Crown Mines.

3 p.m.

METAL POWDER PARTS SYMPOSIUM
(South Garden, Bellevue-Stratford Hotel)

"Presses for Powder Metallurgy," James J. Kux, Kux Machine Co.

"Briquetting Tools," Robert A. Koehler and J. N. Smith, National Cash Register Co.

"Metal Powders and the Tool Engineer," William L. Batten, Vanadium Alloys Steel Co.

3:15 p.m.

NUMERICAL CONTROL SYMPOSIUM
(Ballroom, Convention Center)

"Contouring Control from Numerical Data," John W. Wilson, Cincinnati Milling Machine Co.

"The Tool Engineer and Tape Preparation," H. H. Schatz, Bendix Aviation Corp.

8 p.m.

NUMERICAL CONTROL SYMPOSIUM
(Constitution and Independence Rooms, Sheraton Hotel)

"Numerical Control—First Year Statis-

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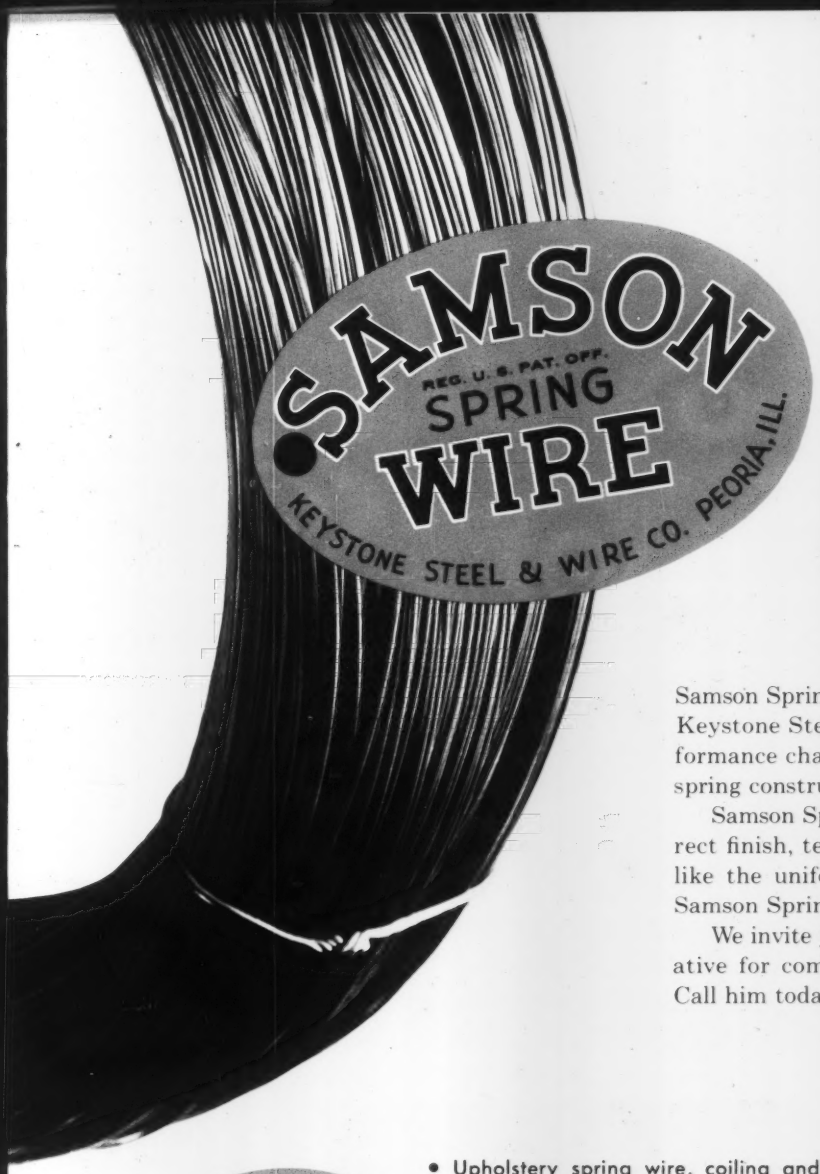

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Samson Spring Wire is custom made with the correct finish, temper and tensile to fit each use. Users like the uniform size and coiling characteristics of Samson Spring Wire.

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- Wire for severe crimping or clinching upholstery spring construction

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Which of these qualities do you want to add to your product?

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Toughness, impact and abrasion resistance

Uniformity and good adhesion of finish

Electrical and thermal insulation

Completely uniform coverage—including sharp edges, corners or projections

announcing . . . CORVEL*

Fusion Bond Finishes

CORVEL Cellulosic Finishing Powders open up new product possibilities for you. Castings, steel wire parts, stampings, etc. can now be clad uniformly with cellulosics in just one dip, with thicknesses that can far exceed those obtainable with conventional finishes. You get a premium appearance with improved durability, and costly machining or preparation of substrate surfaces is often eliminated. CORVEL resins are especially prepared for use with the WHIRLCLAD* Finishing Process.

CORVEL Finishes are applied by dipping the heated object into a fluidized bed of dry CORVEL powders. The powders bond by fusion to the surface of the part. The finishing powders are in a state of "whirling suspension", and the bed of dry powders assumes penetrating flow characteristics much like a liquid.

Get complete details now! Write for our bulletin on CORVEL Finishing Resins including Cellulosics, Nylon, Polyethylene, K-51 (Chlorinated Polyethers) and others.

NATIONAL POLYMER PRODUCTS, INC. / Reading, Pennsylvania
A subsidiary of The Polymer Corporation

*Polymer Corporation Trademark for finishing materials

POLYPENCO*

CORVEL Fusion Bond Finishes are resin powders of various types specially formulated for use with the WHIRLCLAD Finishing Process. This new production process for cladding metals and other materials with plastics is exclusively licensed in the U.S. and Canada by Polymer Processes, Inc., an affiliate company.

ASTE MEETING . . .

tics," Bernerd Gaiennie, Northrop Aircraft Inc.

"Programming for Numerical Control," Carl B. Perry, Douglas Aircraft Co. Inc.

8:30 p.m.

EUROPEAN TOOL ENGINEERING
(Pennsylvania Room, Sheraton Hotel)

"Recent European Metal-Cutting Investigations," Prof. Milton C. Shaw, Massachusetts Institute of Technology.

"Tool Engineering in Europe," J. W. Greve, *Tool Engineer*.

8:30 p.m.

METAL POWDER PARTS SYMPOSIUM
(South Garden, Bellevue-Stratford Hotel)

"Sintering Structural Parts," John H. Speck, Amplex Div., Chrysler Corp.

"Finishing Operations," Peter E. Young, Ford Motor Co.

Wednesday, May 7

9:30 a.m.

AUTOMATION
(Ballroom, Convention Center)

"Machinery and Automation," J. C. Keebler, *Automation*.

"Automation—The Manufacturing, Sales, Engineering Triangle," William C. Allen, Westinghouse Electric Corp.

9:45 a.m.

TITANIUM
(Room 200, Convention Center)

"On Machining Titanium," G. W. Bauer, Mallory-Sharon Metals Corp.

"Design Considerations for Cold Extrusion of Titanium," Alvin M. Sabroff, Rocco A. Sannicandro, Paul D. Frost, Battelle Memorial Institute.

10 a.m.

CUTTING TOOL MATERIAL
(Room 300, Convention Center)

"Cutting Tool Materials of the Future," William Reich, Metallurgical Products Dept., General Electric Corp.

"Today's Cutting Tool Materials," George A. Roberts, Vanadium-Alloys Steel Co.

1:30 p.m.

AUTOMATION
(Ballroom, Convention Center)

"Types of Automatic Assembly Equipment," Lloyd L. Lee, LeMaire Tool & Mfg. Co.

"Automatic Manufacturing with the Integrated Line," Don A. Cargill, Cargill Detroit Corp.

2 p.m.

GENERAL TOOL ENGINEERING
(Room 200, Convention Center)

"Gaging Screw Threads for Acceptability," Eric G. Gabbey, O-Vee Gauge Co.

"Frictional Behavior of Metals and Plastics," Dr. A. O. Schmidt, Kearney & Trecker Corp.; and Elmer J. Weiter, Marquette University.

2:30 p.m.

CREATIVE STANDARDIZATION
(Room 300, Convention Center)

A four-member panel discussion.

Moderator: Samuel H. Watson, Corporate Standardizing Div., Radio Corp. of America.

Speakers: Dr. Allen V. Astin, National Bureau of Standards; W. C. Budge, Westing-

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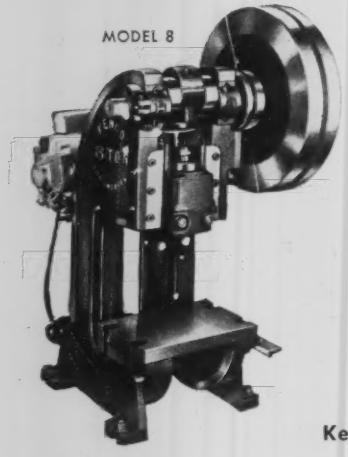
KENCO 8-TON
PRECISION-BUILT
PUNCH PRESSES



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They're Kenco-built with long-wearing parts *throughout* to eliminate downtime and give you *many extra* years of steady, low-cost production. Rigid, multiple-rib frames and extremely long ram ways assure high precision production. Driving mechanism engineered for trouble-free operation. Press is competitively priced.

Model 8-R—8-ton deep-throat, Rigid-Rib

Same construction features, but with 12¾" throat, and tremendous resistance to breakage, deflection, or torsional twist.

Kenco presses—14 models—2 to 15 tons

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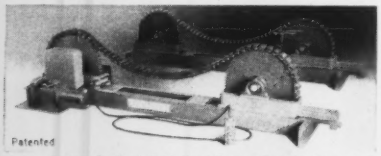

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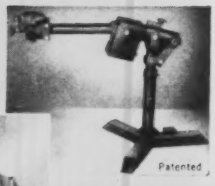
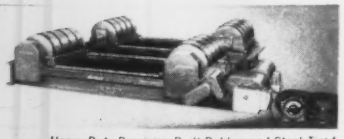
Aronson TracTred (T. M. Reg.) Turning Rolls for thin walled heavy cylindrical work to 27 tons capacity. Zero to 100 IPM turning speed and Built-In Grounding.

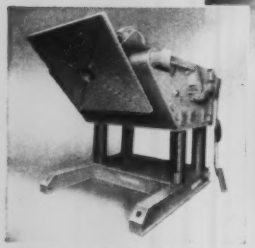
Aronson Universal Balance Positioners (T. M. Reg.) position your weldments effectively, instantly for downhand welding. Capacities to 2000 lbs.



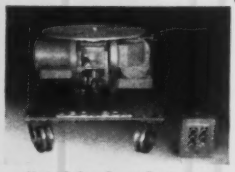
Patented



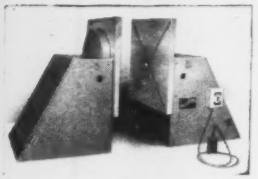
Heavy Duty Precision Built Rubber and Steel Tired Turning and Pipe Rolls, 100% overload protected. Capacities to 600 Tons.



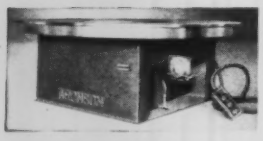
Fully Automatic Gear Driven Positioners, featuring Geared Elevation, 135° Tilting and Variable or Constant Speed Rotation. Capacities to 350,000 lbs.



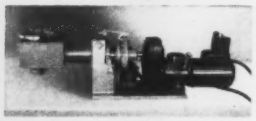
Model D Gear Driven Positioners. Compact. Precise. Rugged. Capacities to 1000 lbs.



Rugged Head and Tail Stock for positioning bulky weldments between centers. Table Backup for Zero Deflection. Magnetic Braking. Capacities to 160,000 lbs. Geared Elevation Optional.



Heavy Duty Floor Turntables with precision speed control and Magnetic Braking, used for welding, burning, X-raying, etc. Capacities to 120,000 lbs., various heights and speeds.



Bench Turntable Automatic Positioners with Mercury Grounding. Capacities to 500 lbs.

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Visit us in Booth 626—Southwestern Metal Exposition—Dallas, Texas—May 12 to 16

ASTE MEETING . . .

house Electric Corp.; Roy Trowbridge, General Motors Corp.; and Leo B. Moore, Massachusetts Institute of Technology.

Thursday, May 8

9:30 a.m.

AUTOMATION

(South Garden, Bellevue-Stratford Hotel)

"High Production Automation through Low-Speed Mechanisms," Julian Wille, Motorola Inc.

"Application of Weldamation Techniques to Welding Processes," John H. Brems, Expert Die & Tool Co. Inc.

9:45 a.m.

GENERAL TOOL ENGINEERING

(North Garden, Bellevue-Stratford Hotel)

"Capacity of Lathe Chucks," E. J. Weller, General Electric Co.

"What Will Mechanical Toolholders Do for You?" Harold E. York, Metallurgical Products Dept., General Electric Co.

"Economic Advantages of Progressive Dies," George E. Gault, Ehrhardt Tool & Machine Co.

1:30 p.m.

AUTOMATION

(South Garden, Bellevue-Stratford Hotel)

"Simplified Setups for Job Shop Automation," Raymond Sollohub and Robert Coen, General Purpose Motor Dept., General Electric Co.

"Automated Special Machines for Low Production Parts," Howard N. Maynard, Snyder Tool & Engineering Co.

"Can the Small Plant Afford Automation?" Ralph Eshelman, *Iron Age*.

"Automation as Applied to Small Lot Production," Werner O. Miller, Textile Machine Works.

PLANT VISITS

Buses for all morning tours leave from the Benjamin Franklin Hotel and return to the Convention Center. Buses for all afternoon tours leave from the Convention Center and return to the Benjamin Franklin Hotel.

Friday, May 2

8:15 a.m.

Tour No. 1—Leeds & Northrup Co., North Wales Plant. One of the most modern electronic controls plants in the world. Limited to 50.

8:45 a.m.

Tour No. 2—Schramm Inc. Complete manufacturing of air compressor units. Limited to 37.

9:15 a.m.

Tour No. 3—Fischer & Porter Co. One of the finer fluids laboratories, complete with combined mechanical and electrical systems. Tour includes luncheon. Limited to 100.

12:30 p.m.

Tour No. 4—Brown Instrument Div., Minneapolis-Honeywell Regulator Co. Manufacturing of pressure gages, flow meters, voltage regulators, and temperature controls. Limited to 25.

Tour No. 5 — Budd Co., Red Lion Plant. An opportunity to see the assembly

typical large drill bit

Surface metal is cut away to shape drill point and spiral flutes — core is exposed to wear, structural loads

Point and cutting lips are critical to drill performance. If alloy has any weakness at center, poor cutting or broken drill will result. Mel-Trol helps to solve this problem by providing greater strength and toughness at the core. Never before have commercially available alloys been as free of segregation, porosity and centerline weakness.

MEL-TROL®

... alleviates a major metalworking problem— poor centerline quality in alloys

The more surface metal you cut away from an alloy steel bar, the more important uniform core quality becomes. The drill illustration above shows you why.

In alloy steels made by conventional steelmaking process, segregation, porosity or other inhomogeneities are often found along the centerline. Result: the core metal lacks the toughness of the rest of the bar, even though it may show no detectable variation.

To alleviate this major cause of poor tool quality, poor tool life and excessive rejects, Carpenter metallurgists developed the Mel-Trol process. Now, for the first time, alloys with greater uniformity from surface to centerline are being made in quantity.

The Mel-Trol process provides greater freedom from segregation, porosity and centerline weakness through a system of quality controls which play a part in every phase of the entire steelmaking process. Equipment developed specifically for Carpenter is used together with the most modern standard quality control tools. Every piece of equipment is used to its highest accuracy—nothing less.

Mel-Trol alloys are now available at Carpenter mill-branch warehouses. Ask about them the next time a Carpenter representative calls on you. He'll show you how you can join the growing number of companies who are finding Mel-Trol alloys the answer to a host of metalworking problems.

Carpenter STEEL

The Carpenter Steel Company, 139 W. Bern St., Reading, Pa.
Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Pioneering in improved specialty steels through continuing research

ASTE MEETING . . .

of stainless steel railway passenger cars. Limited to 50. Must be U. S. citizens.

1 p.m.

Tour No. 6—Curtis Publishing Co., Curtis Park Plant. See how a million issues of the *Saturday Evening Post* are put together every working day. Limited to 75.

Monday, May 5

8 a.m.

Tour No. 7—U. S. Steel Corp., Fairless Works. Tour includes ore piers, docks, blast furnaces, rolling mill, tinning process, and pickling process. Limited to 50.

8:30 a.m.

Tour No. 8—Standard Pressed Steel Co., Jenkintown. You will see the latest in heat-treating equipment, the metallurgical testing laboratory, the gageroom, tool and die room, and the automatic plating line. Limited to 100.

9:15 a.m.

Tour No. 9—Philadelphia Naval Shipyard. A visit to submarines, destroyer escorts, the drydocks and part of the Navy's "mothball" fleet are scheduled. No cameras permitted. Limited to 200.

11:30 a.m.

Tour No. 10—Plymouth Div., Chrysler Corp. Largest Plymouth assembly plant outside Michigan. Limited to 50.

12:15 p.m.

Tour No. 11—Campbell Soup Co. The preparation, blending, and cooking of soups. Tour also includes refreshments and samples. Limited to 40.

1 p.m.

Tour No. 12—A repeat of Tour No. 6.

Tuesday, May 6

8:30 a.m.

Tour No. 13—A repeat of Tour No. 8.

8:45 a.m.

Tour No. 14—Budd Co., Hunting Park Plant—Visitors will see the production of automotive body components. Limited to 50. Must be U. S. citizens.

9:15 a.m.

Tour No. 15—A repeat of Tour No. 9.

10 a.m.

Tour No. 16—Simonds Abrasive Co., a division of Simonds Saw & Steel Co. How grinding wheels are made. Tour will also include luncheon. Limited to 37.

12 noon

Tour No. 17—A repeat of Tour No. 7.

12:30 p.m.

Tour No. 18—Link-Belt Co., Nicetown. Production of mechanical power transmission equipment. Limited to 40.

1 p.m.

Tour No. 19—Special Products Div., I-T-E Circuit Breaker Co., manufacturer of delicate radar components, analyzers, and antenna systems. Limited to 100. Must be U. S. citizens.

Wednesday, May 7

8 a.m.

Tour No. 20—A repeat of Tour No. 7.

8:30 a.m.

Tour No. 21—A repeat of Tour No. 8.

9:15 a.m.

Tour No. 22—A repeat of Tour No. 9.

12:30 p.m.

Tour No. 23—A repeat of Tour No. 18.

1 p.m.

Tour No. 24—Circuit Breaker Div., I-T-E Circuit Breaker Co. Manufacturing of molded case circuit breakers for protecting branch and feeder circuits on power and lighting loads. Limited to 100. Must be U. S. citizens.

Tour No. 25—Yale Materials Handling Div., Yale & Towne Mfg. Co. Manufacture of lift trucks and electric hoists. Limited to 40.

1:15 p.m.

Tour No. 26—Cuneo Eastern Press Inc. Visitors will see how many of the leading magazines are printed and compiled —including sections of *Time* and *Life*. Limited to 25.

Thursday, May 8

8:15 a.m.

Tour No. 27—A repeat of Tour No. 1.

9:15 a.m.

Tour No. 28—A repeat of Tour No. 9.

10 a.m.

Tour No. 29—A repeat of Tour No. 16.

1 p.m.

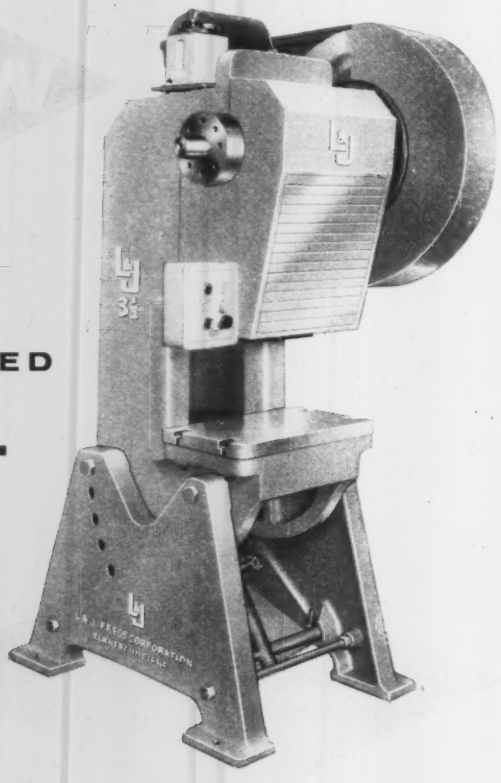
Tour No. 30—A repeat of Tour No. 25.

NEW

L&J

HIGH SPEED

Multi-Duty Press



OPTIONAL EQUIPMENT

Oil shield. Air clutch. Left or right fly wheel mounting. Variable speed drive. Automatic feed. Automatic misfeed stop. Accurate top stop. Push button or dial speed controls. Electric speed indicator. J.I.C. wiring. Automatic lubrication. Stroke length and shut height to fit the job. Bronze gibs, etc.

- A completely new No. 3½ — 27 ton — punch press that offers many advantages.
- Improved frame design gives greater rigidity for better accuracy and longer die life.
- Fully enclosed for extra safety and cleanliness.
- Speeds to 450 s.p.m. with 1" stroke (2½" standard — 4" maximum to order).
- Efficient at all speeds — on all jobs.
- Readily adaptable to special jobs at low cost.

Straight Side Punch Presses
Single and Double Crank
Versatile, fast for volume production of small parts with large or progressive dies. 20 to 150 tons.

NEW L & J CATALOG with complete specifications and construction features of 23 O.B.I. punch presses in geared and non-geared types from 14 to 90 ton capacities. Also, Straight Side Punch Press. *Write for your copy now.*

L & J PRESS CORPORATION 1628 STERLING AVE. ELKHART, INDIANA

2,000,000 DEFLECTIONS WITHOUT FAILURE.....Severe fatigue tests show Duraflex,® Anaconda superfine-grain Phosphor Bronze, permits far higher design stress

LICENSED
PROFESSIONAL ENGINEERS, MEMBERS
AMERICAN SOCIETY FOR TESTING MATERIALS
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CONSULTING ENGINEERS
THE CARLSON COMPANY
MACHINE DESIGNERS

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Complete engineering and manufacturing services including design and development of special machinery, mechanical products and spring actuated mechanisms. Stress analysis, spring design, metallurgical data, heat treatment, plant layout, engineering reports, selection of materials and equipment. Tools and products.

The American Brass Company,
99 Park Avenue,
New York 16, New York.

October 25, 1957.

Gentlemen, SUMMARY OF ENGINEERING LABORATORY REPORT NO. 102557

SUBJECT: Fatigue Life Test of "Duraflex", Superfine-Grain Phosphor Bronze and Commercial Quality Grade A Phosphor Bronze spring wire.

SPECIMENS: Compression springs made from each material, were coiled on arbors to avoid tool marks. The springs had squared ends, a high pitch to obtain high stresses and were heated after coiling in boiling water for 1 hour to relieve residual coiling stresses.

CALIBRATIONS: Each spring had its physical dimensions measured with micrometers and vernier calipers and was load tested in a Comaco Elasticometer Precision Spring Testing Instrument, before fatigue testing and after each 100,000 cycles of deflection to determine loss of load, if any.

FATIGUE TESTING: A representative number of springs from each material were tested simultaneously under identical conditions.

STRESSES: The stress in the springs, including curvature correction, during the tests were as follows:

Stress at Initial Installed Position	36,600 p.s.i.
Stress at Final Deflected Position	73,200 p.s.i.
Stress Range during deflection	36,600 p.s.i.

These stresses, for endurence limit testing, are exceptionally high for phosphor bronze spring wire - far higher than those ordinarily recommended for Beryllium-Copper or Stainless Steel for such severe service and are comparable to those used for good quality Spring Steel.

RESULTS: Grade A Springs broke at average deflections of 505,700.

Duraflex Springs were still satisfactory with no appreciable loss of load at 2,000,000 deflections.

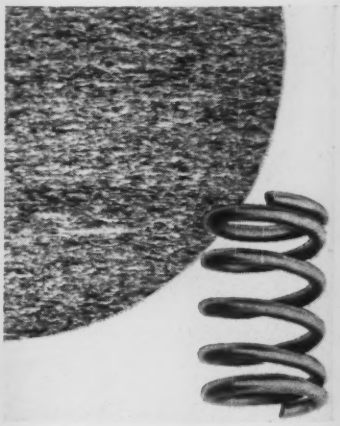
CONCLUSIONS: 1. Design stresses for Duraflex can be at least 33% higher than those used for Grade A Phosphor Bronze and as high if not higher than design stresses recommended for Beryllium Copper.

2. High endurance and long fatigue life at high stresses can be expected from springs made of Duraflex Phosphor Bronze.

CERTIFICATION: We certify the above summary of our report is accurate, in accordance with the facts and is true in every respect.

Respectfully submitted,
THE CARLSON COMPANY
Harold Carlson
Harold C. H. Carlson, P.E.
Licensed Professional Engineer.

Spring of Alloy A Phosphor Bronze, shown actual size, which broke just after 500,000 deflections. Micrograph (75x) shows typical grain structure of this metal.



Spring of Duraflex showed no appreciable loss of load after 2,000,000 deflections in same test. Micrograph (75x) shows typical superfine-grain structure of Duraflex.

Duraflex is a registered trade-mark for a higher quality phosphor bronze in sheet and wire forms, recently developed by American Brass Company research. Yet it costs no more than regular phosphor bronze. For detailed information—for a copy of the test data—write The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 5845

DURAFLEX

Superfine-Grain Phosphor Bronze

A product of

ANACONDA®

Made by The American Brass Company

PRODUCTION MORE THAN TRIPLED . . .
PAINT MILEAGE INCREASED 75% WITH

Ransburg
NO. 2 PROCESS

One Ransburg reciprocating disk uniformly coats 7 complete sets of gasoline pump housings and parts per gallon of paint. Former hand spray produced only 4 sets per gallon.

● Bowser, Inc. Fort Wayne Division is continuously on the lookout for improved manufacturing methods in the production of their quality line of gasoline pumps.

That's why they modernized their finishing department . . . installed a conveyor . . . new oven . . . and replaced hand spray with one RANSBURG No. 2 PROCESS reciprocating disk unit.

RESULTS? Paint mileage increased 75% with less labor. With hand spray, they painted enough pump housings and parts for 4 pumps per gallon of paint. Now, with *Electrostatic*, they're painting 7 complete pump sets per gallon.

Where Bowser formerly needed two shifts in finishing, one shift now handles even greater production. With hand spray and limited oven facilities, they used to turn out 15 sets per hour. Now, they can paint 55 sets an hour, either prime or finish. Color changes are made quickly and easily with Ransburg equipment, and because of its efficiency in operation, maintenance cost in the paint area is cut 50%.

NO REASON WHY YOU CAN'T DO IT, TOO!

Whatever your product, if it's painted, we'd like to tell you more about the worthwhile savings and advantages which can be yours with RANSBURG ELECTROSTATIC PAINTING PROCESSES. Write for our No. 2 Process brochure which cites numerous examples of electrostatic spray painting on a wide variety of products.

Ransburg **ELECTRO-COATING CORP.**
Indianapolis 7, Indiana

RANSBURG

New Route to Pig

Strategic-Udy process employs rotary kiln and electric furnace to reduce ore to hot metal

STRATEGIC Materials Corp. and Koppers Co. Inc. are revealing the details of their Strategic-Udy process for the direct reduction of iron ore.

The process has been demonstrated in a prototype plant at Niagara Falls, Ont. It employs a rotary kiln, an electric furnace, and a standard material handling system.

How It Works—Iron ore mixed with fluxes and cheap carbon fuel is fed into the direct fired kiln where it is heated between 2000 and 2370° F. Particles are discharged from the kiln into an electric furnace which completes the reduction process to liquid metal. Combustible gases from the electric furnace help heat the kiln.

The process may be feasible near ore sites and where electric power is cheap. It does not appear to be immediately competitive at major steel centers, but rising costs of conventional reduction may soon alter that picture.

Advantages — The pilot plant shows the process has these good features:

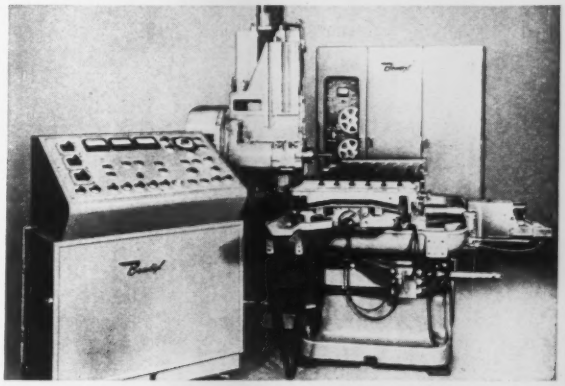
1. Ore size is not critical. The process will accept lumps or dust.
2. It will handle complex ores. It can selectively remove phosphorus, sulfur, copper, nickel, manganese, chromium, titanium, and other elements. They are concentrated in slags which in some cases are valuable byproducts.
3. The carbon fuel may range from peat to coke.
4. Control of carbon content of the pig iron is possible. The process can make 3.5 per cent carbon pig and 0.5 per cent carbon semi-steel.
5. Electric power requirements are low. Start-up is fast.
6. Capital construction costs are low.
7. Capacity, starting at 50 tons per day, is practically unlimited.
8. The hot metal product may be transferred directly to a refining furnace, making the process continuous from ore to steel.

Numerical Control Units Operate Three-Axis Milling Machine

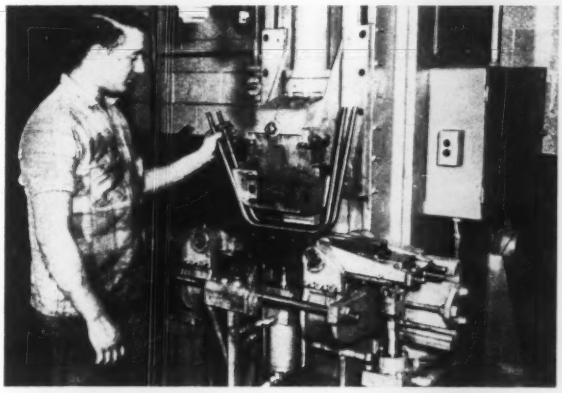
A contour milling machine with control and tape preparation units makes intricate parts from design drawings—without templates, cams, or models.

The tape preparation unit has a Flex-O-Writer, computer, storage unit, and tape punch. It produces the tape for the control unit, which has hydraulic power supply, servodrives, and feedback units to direct machine movement.

Leadtime savings up to 75 per cent and tool cost savings as high as 80 per cent are possible. Parts produced by tape controlled machine tools are accurate and require a minimum of inspection operation. *Write*: Bendix Aviation Corp., 21820 Wyoming Ave., Oak Park, Mich. *Phone*: Lincoln 7-9800 (Tool Show Booth 936)



One Stroke of Tube Bending Press Produces Four Bends



Production rates up to 3000 bends an hour are possible on this machine. Wing dies which wrap the tube around the ram are mounted in slides to keep them from rubbing and marring the work. Adjustments are provided for quick die setup.

The press can be set up to make small radius crush bends in material that will not take conventional bend stresses.

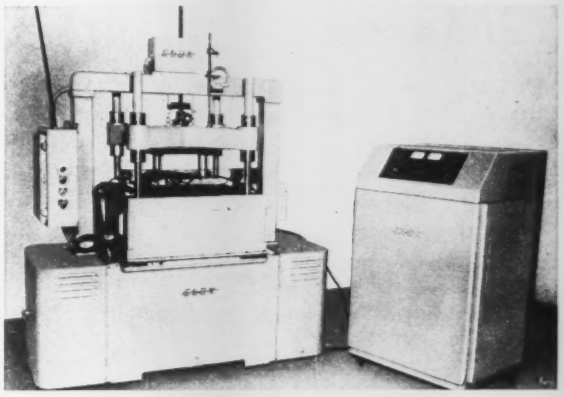
Also available is a model which forms a series of different angles and planes progressively in tubing. An automatic indexing turret selects the specific angle. Adequate clearance permits forming of complicated shapes at speeds up to 1200 bends an hour. *Write*: Pines Engineering Co. Inc., 601 Walnut St., Aurora, Ill. *Phone*: Aurora 6-7701 (Tool Show Booth 1317)

Electrical Discharge Equipment Machines Tough Die Alloys

Primarily designed to produce forging dies, precision electrical discharge machines can also be used for air foils, intricate and deep hole drilling, cavity production runs, and through-hole work in hard-to-machine metals.

Heat treating of dies before machining is standard procedure for this method of operation. It permits work hardened die cavities to be resunk on the same equipment. After setup, the cavity making process is automatic. After reaching a predetermined depth, the machine shuts off.

Savings of 50 per cent in new die work and 75 per cent in resinking can be realized. *Write*: Elox Corp. of Michigan, 1830 N. Stephenson Highway, Royal Oak 3, Mich. *Phone*: Mulberry 9-1921 (Tool Show Booth 935)



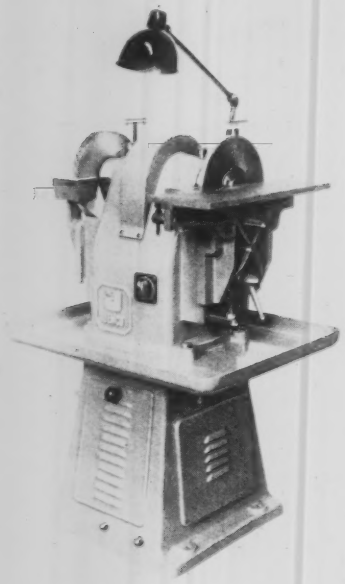
NEW PRODUCTS and equipment

Discs File Rapidly

The Jemco disc filing machine provides quick and accurate machining of ferrous and nonferrous metals. It can be equipped with two discs at a time ranging in size from 3⅛ to 12 in. in diameter.

Suitable discs for various kinds of work are available: High speed steel and carbide for ferrous metals; carbon steel for nonferrous. All come with regrindable teeth.

The machine's worktable has provision for mounting fixtures or special sliding tables. Handling for quick deburring is negligible. The



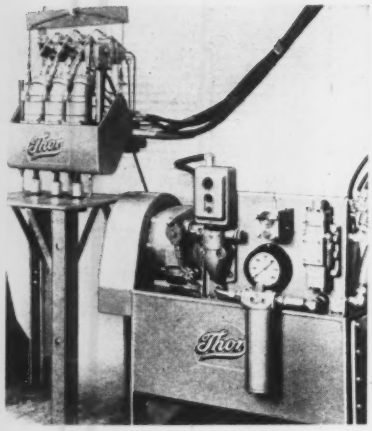
unit is powered by a 1-hp motor which turns discs at speeds of 175, 250, 310, 370, and 410 rpm. Additional variations can be achieved by changing pulleys.

The unit is 32 in. high, 28 in. wide, and weighs 510 lb. *Write*: Jersey Mfg. Co., 401 Livingston St., Elizabeth 1, N. J. *Phone*: Elizabeth 4-8222 (Tool Show Booth 2154)

Torque Applied Equally

The Thor-Draulic multiple nutsetter, designed for industrial assembly operations, is equipped with a completely hydraulic torque control system.

Powered by a unit which can be positioned 30 ft away and designed



with two-stage hydraulic driving, the system shown delivers uniform torque to ±1 ft-lb simultaneously to three nuts. The new system can be designed to provide the same torque uniformity to as many as 20 threaded fasteners.

It can be adapted to control the driving of other multiple power tools. *Write*: Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill. *Phone*: Aurora 2-7601 (Tool Show Booth 1845)

Cutter Deburrs and Trims

The Roto-Edge Cutter is a semiportable, compressed air powered machine for deburring and trimming workpieces having sharp or uneven edges. It eliminates hand filing, sanding, or grinding metals and other materials.

The cutter operates on about 25 psi, weighs 170 lb, and requires less than 3 sq ft of floor space.

Skill is unnecessary for operation.

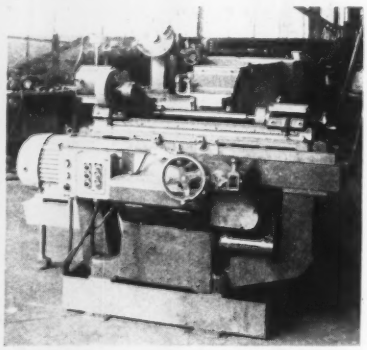
The workpiece is held against two right-angled fences spaced to allow one edge of the material to project into the path of the cutting disc. The machine has an 8-in. stroke which can be doubled by reversing the piece for a second pass.

The working edge of the disc is slightly inclined from the horizontal. The resulting slicing action increases cutting efficiency. Depth of cut is adjustable to ⅛ in., and the cutting edge is shaped to draw the piece tightly against the fences.

The platform-fence unit is removable and may be interchanged with other fixtures. *Write*: Tool Div., American Machine & Foundry Co., 224 Glenwood Ave., Bloomfield, N. J. *Phone*: Pilgrim 8-1525 (Tool Show Booth 1164)

Belt Grinds Cylinders

Here's a cylindrical grinding machine that uses abrasive belts for cutting. Design is conventional. The pilot model handled work up to 18 in. long and 4 in. in diameter.

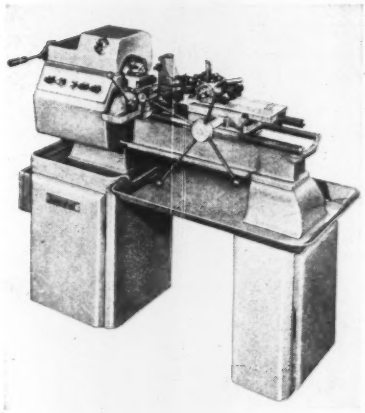


Standard idler backstand equipment permits use of belts 168 in. long. The table has a rack and pinion drive powered by a reversible gear motor. The reversing and traversing speed is controlled from a convenient pushbutton station. *Write*: Production Machine Co., Greenfield, Mass. *Phone*: Prescott 3-3634 (Tool Show Booth 1811)

Tachometer in Headstock

The ZWM-46-P high speed, second operation, hand turret lathe has a pushbutton variable speed drive with spindle speeds from 40 to 2000 rpm. A tachometer is built into the headstock.

Other features include 13-in. swing over bed, 6¼-in. swing over

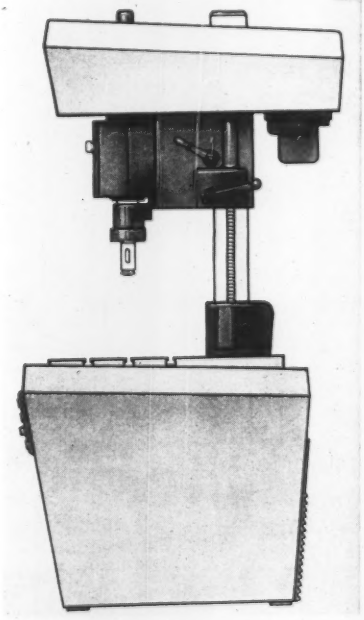


the cross slide, 6½-in. stroke of turret, and 1 1/16-in. spindle collet capacity. *Write*: Sheldon Machine Co. Inc., 4258 N. Knox Ave., Chicago 41, Ill. *Phone*: Mulberry 5-1970 (Tool Show Booth 724)

Tapping Made Flexible

A production lead screw tapping machine designed for production applications is readily adaptable for single spindle use.

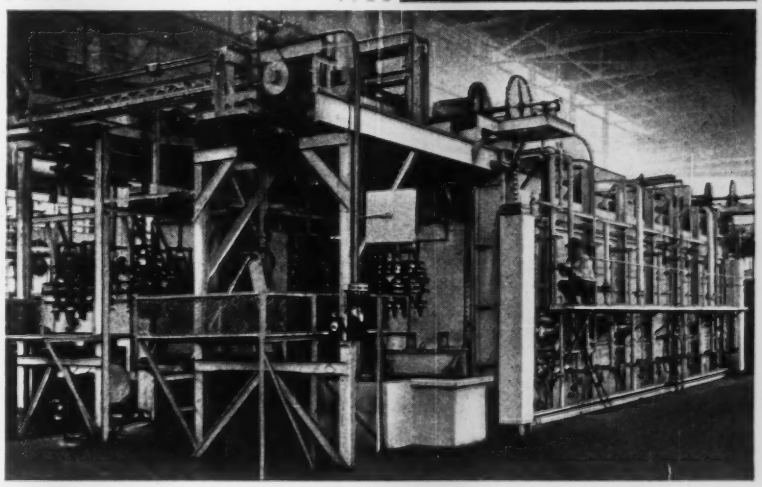
Furnished with a flanged quill for multiple tapping head use, interchangeable single spindle noses are also available with No. 1, 2, or 3 Morse taper adjustable adapters. Any of these spindle noses (avail-



HOLCROFT...FINEST IN HEAT TREAT FURNACES FOR OVER 40 YEARS

EXPERIENCE PAYS OFF IN HEAT TREAT FURNACES

1958 1928



HOLCROFT HAS IT!

Take, for example, the crankshaft heat treating furnaces illustrated above. Years of experience preceded the design and development of the old *1928* unit . . . and in its day it was one of the best, turning out a phenomenal 150 cranks an hour with just four operators.

Today, Holcroft is still building the best . . . as typified by the modern crankshaft unit above. Here, Holcroft has conveyor-integrated three separate units . . . each consisting of a hardening furnace, quench tank, draw furnace and cooling station . . . into a completely automated installation capable of heat treating 456 crankshafts an hour. And only two men are required to perform the *one* manual operation . . . transferring cranks from one conveyor to another at the central loading station. So you see, in production heat treat furnaces, Holcroft experience *does* pay-off, in better heat treating, more efficient operation, lower production costs than ordinary, perhaps less expensive furnaces,can give you.

HOLCROFT AND COMPANY

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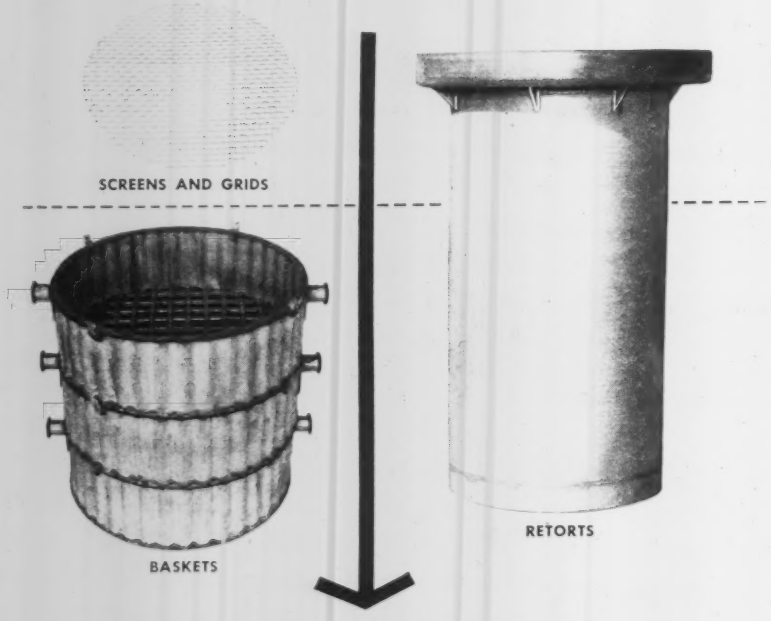
PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO, ILL. • CLEVELAND, OHIO • HARTFORD, CONN. • HOUSTON, TEXAS • PHILA., PA.

CANADA: Walker Metal Products, Ltd., Windsor, Ontario

ROLOCK
FABRICATED ALLOYS

HEAT AND CORROSION RESISTANT



ROLOCK "ALL THE WAY"

for a better operating cost picture on your pit-type furnaces

Rolock has so many successful pit-type furnace equipment installations . . . *so many satisfied repeat customers* . . . that we feel very confident in promising you equal satisfaction.

Furthermore, we make *all* the basic equipment needs for pit-type furnaces of every popular size and type . . . retorts, screens, grids, baskets, fixtures, or specially designed work carriers. In each you will find unique ROLOCK design and construction features that are PROVED life-lengtheners . . . performance-improvers . . . long-term cost-reducers.

The best way to gain these benefits is to try us out on your next order . . . either for "standardized" items or special needs. A letter or 'phone call will get prompt action.

SALES AND SERVICE REPRESENTATIVES FROM COAST TO COAST

ROLOCK INC., 1262 KINGS HIGHWAY, FAIRFIELD, CONN.

JOB-ENGINEERED for better work
Easier Operation, Lower Cost

SRL58

able as extras) can be mounted in minutes.

Speed change gears permit a wide range of spindle speeds—from 220 to 1200 rpm. The headstock is adjustable on the column from 4 to 34 in. from table to spindle nose.

Easily interchanged lead screws and lead screw nuts cover a range from 6 to 32 pitch. Standard accessory multiple spindle adjustable tapping heads and coaxial air-operated rapid approach and return of the quill are available. *Write*: Wisconsin Drill Head Co., Butler, Wis. *Phone*: Sunset 1-9464 (Tool Show Booth 1760)

Air Powers Press Unloader

This P. A. S. straightline press unloader, a standard air-powered package unit, handles sheet metal panels or forgings. It has a portable

A-frame type mounting and is equipped with a Vac-Hand attachment. Induced-suction rubber cups avoid marking of panels or moldings. *Write*: Press Automation Systems Inc., 25418 Ryan Rd., Centerline, Mich. *Phone*: Jefferson 9-7750 (Tool Show Booth 1256)

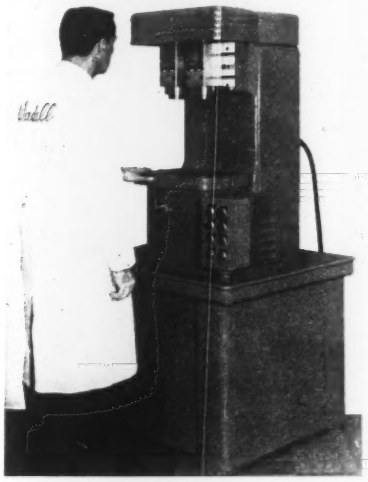
Boring Cycle Automatic

Model VBM vertical precision boring machine affords convenience of workpiece handling, simplifies tooling, and allows more extensive use of two or more spindles.

Automatic indexing tables are readily adaptable, offering the advantages of loading and unloading workpieces while the machine is cycling automatically.

Cycling is controlled by a simple plate cam. All machine movements

NEW PRODUCTS and equipment

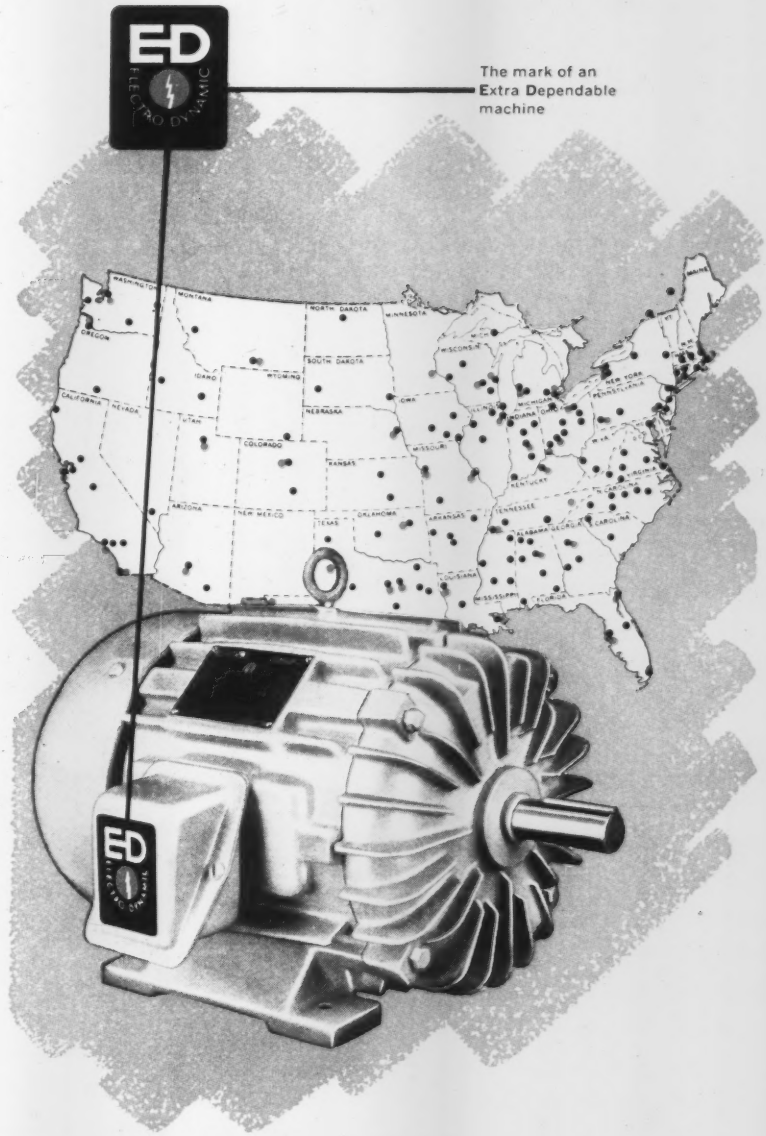


are timed through the camshaft. Feed change gears make possible an almost infinite variation of the feed rate. *Write*: Wadell Equipment Co., 159 Terminal Ave., Clark, N. J. *Phone*: Fulton 1-0400 (Tool Show Booth 1816)

Drill Setting Locked

A precision drilling machine has been developed that eliminates height gage layout and common errors in drilling sheet metal templates.

By means of a precision ground lead screw and dial which can be read to 0.001 in., measurements can be made to a high degree of accuracy, and the dimension setting



Wherever you are...
there's an E.D. expert near you

As the map shows, there is an E.D. sales or service office close to you. What the map doesn't show are the more than 25 warehouses which permit fast deliveries of components or complete motors.

Built on years (over 75) of experience, the knowledge and reputation of Electro Dynamic back every sale.

Complete line of a.c. and d.c. motors from 1 to 300 h.p., Geared Motors, Selectrol and Selectron Variable Speed Drives and Motor Generator sets.

Telephone or write for Bulletin 50-A.

ELECTRO DYNAMIC
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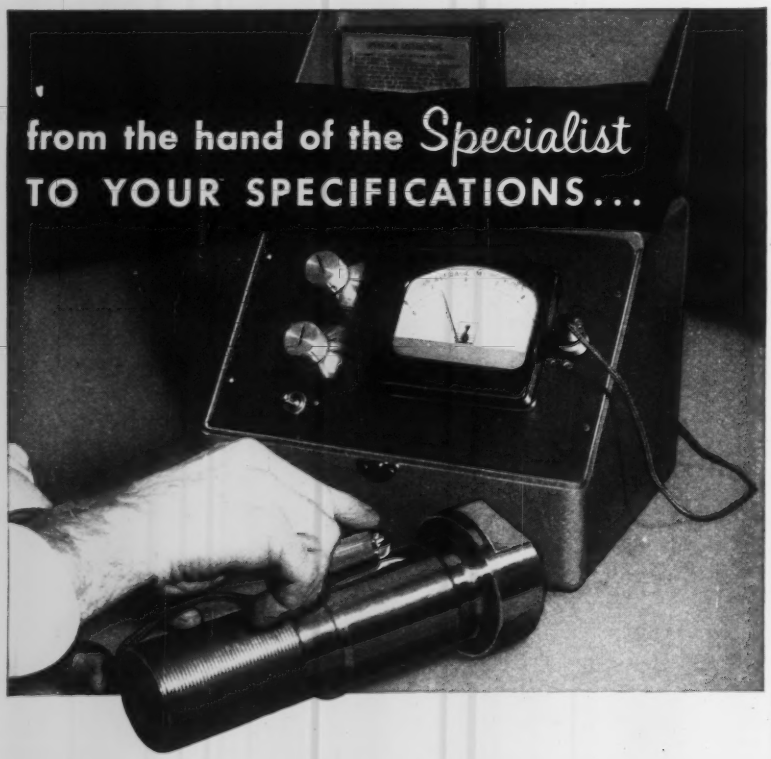
CORPORATION
BAYONNE, NEW JERSEY

is positively locked during drilling. Wear on the lead screw is minimized (after dimensions have been set, movement of the drill carriage takes place with the lead screw disengaged).

A base line is established anywhere within the 24 x 24 in. table by adjusting the zero position of the built-in flexible steel tape which can be read to the right or left from zero.

An integral bend allowance calculator permits drilling in the flat with proper compensation for material stretch around bends. Usable for material up to 0.100 in. thick, the calculator can be set up to handle dimensions from inside or outside the flange.

The machine utilizes a 110-volt standard industrial ¼-in. drill motor. *Write*: Wales-Strippit Co., a unit of Houdaille Industries Inc., 210 S. Buell Rd., Akron, N. Y. *Phone*: 9441 (Tool Show Booth 1622)



ERIE Bolts • Studs • Cap Screws • Nuts
In Alloys • Stainless • Carbon • Bronze

The reading on this Surfindicator measures more than just the fine finish on this special bolt. It measures the result of the precision craftsmanship your own specifications receive at Erie Bolt & Nut Company. Producing a wide variety of special fasteners to resist corrosion, extremes in temperature and tensile stresses as specified is our exclusive job . . . has been for almost half a century.
Send us your specifications for prompt estimate.

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Installs Socket Screws

The Setomatic set screw driver will fit into an automated production line or can be attached to a single machine. It will install screws manually, or automatically at speeds up to 2500 an hour, and will handle sizes up to ⅜ in. in diameter and ¾ in. long.

The supply system picks up screws of any type point from a hopper, orients and feeds them into a driver feed tube. The drive mechanism inserts them into tapped holes and tightens them to a preset, closely controlled torque. The feeder unit stops when the supply of screws drops below a predetermined level.

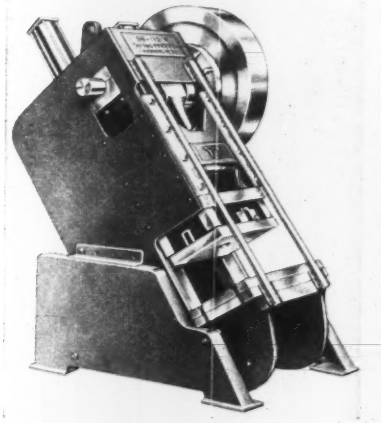
Screws can be installed vertically, horizontally, or at any angle. With a single control, units mounted at 90 degrees to each other can install two screws simultaneously. If a poorly tapped hole is encountered, a slip clutch stops the driver and a cam returns it to start position.

The machine is distributed on a rental basis. *Write*: Standard Pressed Steel Co., Jenkintown, Pa. *Phone*: Turner 4-7300 (Tool Show Booth 322)

Press Design Improved

A welded steel frame, 110 ton, box slide press built to JIC standards incorporates several innovations in press construction.

Features include a self-cooling combination brake and clutch with friction surfaces of sintered metal (for longer life). Both linings can be replaced without removing the wheel. In the body, the slide has ways 35 in. long. The pivot point



of the pitman connection is near the bottom of the slide.

Hand adjustment is standard and a lock is provided to prevent change during operation. The inclining mechanism can be operated manually or by air power. Design permits the balance wheel, backshaft, and motor drive (except for the pinion and bearing) to be enclosed within the body. *Write*: V & O Press Div., Emhart Mfg. Co., Hudson, N. Y. *Phone*: 8-1577 (Tool Show Booth 721)

Tester Easy To Use

Efficient and rapid production testing of small ferrous parts up to 24 in. long is possible with this nondestructive type unit. The water base, wet magnetic particle method is used.

Advantages include larger work area, less floor space, lower table height, convenient controls, suspended magnetic heads and coil, and freedom to conveyorize in either direction. *Write*: Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill. *Phone*: Underhill 7-8000 (Tool Show Booth 102)

Drill Has Power Feed

The Bux-Matic portable, magnetic drill press has positive, automatic power feed and two-speed control. The unit is capable of drilling up to 1¾ in. holes in any position—overhead, vertical, or horizontal.

Bux adapters are available for all makes and sizes of portable

TOCCO Chose Reading Electric Hoists . . .

This Reading electric hoist is moving a sheet metal cabinet from a heating station to the production line. All Reading hoists at Tocco have the same two-button pendant control.

● Rapidly rising production goals are being met in Ohio Crankshaft's new Tocco Division plant in Cleveland's South Side . . . thanks partly to Reading Electric Hoists.

Tocco, a leading producer of induction heating equipment, designed the new plant to meet the needs of its rapid expansion. Pre-planned materials handling, involving trucks, bridge cranes and electric hoists, is paying off in fast, orderly movement of materials from operation to operation.

Playing a big role in this integrated handling system is a series of Reading electric hoists, "custom-built" from standard Reading units to meet the exact requirements of each operation. These hoists permit Tocco workmen to move all material without manual lifting.

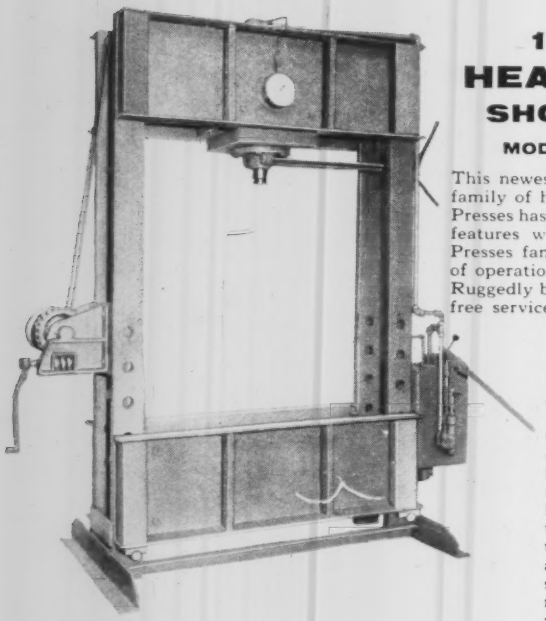
Reading's unique "Unit Construction" plan offers you special equipment for your own plant at the low cost of standard parts. Investigate now this proven way to get faster, better materials handling. A note on your company letterhead will bring a Reading engineer to analyze your handling operations . . . at no obligation.

Reading Crane & Hoist Corporation, 2102 Adams St., Reading, Pa.

READING HOISTS

CHAIN HOISTS · OVERHEAD TRAVELING CRANES · ELECTRIC HOISTS

Packs a lot of MUSCLE
K. R. WILSON



150 TON HEAVY DUTY SHOP PRESS

MODEL 37KAA-150

This newest member of the KRW family of hand-operated Hydraulic Presses has all the "built-in" quality features which have made KRW Presses famous for ease and speed of operation.

Ruggedly built for years of trouble-free service, this press is designed to handle jobs requiring pressures up to 150 tons, yet it is sensitive enough to handle those jobs requiring very light pressures.

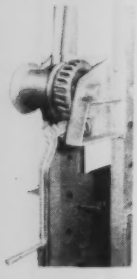
Open side construction combined with the extra large daylight opening give this press unparalleled versatility. Permits the straightening of extra long bars or shafts and makes it ideal for straightening axles, connecting rods and similar applications.

ADDITIONAL FEATURES WHICH MAKE THIS AN OUTSTANDING NEW PRESS ARE:

✶ Capstan Hand Wheel that speeds the ram to the work in a matter of seconds and can be operated mechanically to 3 tons.

✶ Pressure Release Control Valve that can be opened or closed with a flip of the finger.

✶ Detachable Pump Handle on the Pumping Unit which is positioned at a convenient operational height to prevent operator fatigue.

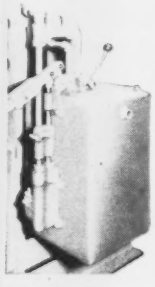


NEW HEAVY DUTY ◀ GEARED TYPE WINCH

with positive stop permits quick, easy, safe, one-man adjustment of bed height. Gear ratio 24 to 1.

NEW 2-SPEED HAND-OPERATED PUMP ▶

gives complete, accurate control of ram pressures. Press also available with motor drive or can be converted later with KRW conversion package.



Specifications

MODEL 37KAA-150

Hand operated. Capacity to 150 tons. Opening between uprights left to right 48". Maximum daylight 45". Minimum daylight 8".

Accessories included

1 pair matched V-blocks. Dual calibrated pressure gauge. Flat Ram nose.

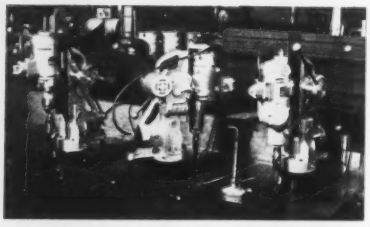
Whatever your press problems there is a K. R. Wilson Press that can help you do a better job faster, more economically. Write for complete information today.

HYDRAULICS DIVISION

K. R. WILSON, Inc.

Offices & Factories – 216 Main St., Arcade, N.Y., U.S.A.

NEW PRODUCTS and equipment



drills, air operated or electric. A 6-ft safety chain for overhead operation and a twist-lock type plug receptacle are included with each unit.

Operator fatigue is eliminated and drill bit life is lengthened. *Write*: Buck Mfg. Co., 1355 N. Tenth St., P. O. Box 692, San Jose 12, Calif. *Phone*: Cypress 7-6323 (Tool Show Booth 2141)

Lathe First of Series

An automated turret lathe with 14-in. swing and 1⅝-in. spindle hole is the first of a new Logan series designed for efficient short or long production runs.

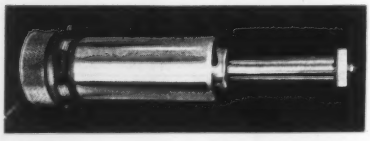
Powered by a two speed, reversing motor with variable speed drive, it provides high accuracy and flexibility at low cost.

Other specifications: Direct current motor powered feed on turret, infinite variation of feed rates, infeed limit position adjustable for each turret station, and rapid travel feed cycle variations selected with setup switches. *Write*: Logan Engineering Co., 4905 Lawrence Ave., Chicago 30, Ill. *Phone*: Pensacola 6-7500 (Tool Show Booth 625)

Quill Holds Tolerances

The Super 80 power (1½ hp) quill is capable of continuously adjustable speeds from 10,000 to 25,000 rpm with standard 110-volt power supply. These speeds permit the use of the hardest cutting tools for faster, more efficient micro-milling and maintenance of tolerances within 0.0001 in.

This tool was designed especially

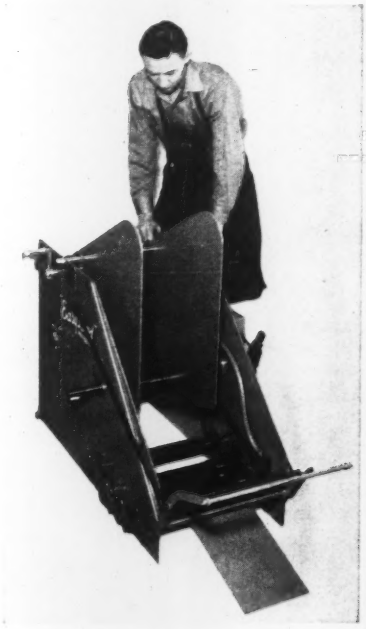


for the production of small and medium sized precision parts such as found in instruments, electronic devices, and guided missile and aircraft components.

A spindle extension is obtainable for grinding and finishing deep cavities in dies and castings and can be adapted to Precise tools without loss of torque, speed, or precision. *Write*: Precise Products Corp., 3700 Blue River Rd., Racine, Wis. *Phone*: Melrose 2-8891 (Tool Show Booth 1155)

Coil Cradle

All rolls of the No. 2010 J coil cradle are mounted in flange style ball bearing units. Suspended separator plates are "J" type.



Rubber covered rolls and pinch roll attachment are optional. *Write*: Rowe Machinery & Mfg Co., Dallas, Tex. *Phone*: Riverside 1-6365 (Tool Show Booth 800)

Turret Has Six Spindles

The Model B turret drilling machine features self-centering spindles, extreme sensitivity, and preselective controls for speed, depth, and tapping on each of the turret spindles. It has a capacity of 1 in. in steel and has preselective, in-

CAMPBELL HALL-MARK CHAIN

is identified 3 ways... for your permanent protection

1 BY MAKE . . .
The Campbell "C" is permanently in relief on every other link . . . your Campbell identification.

2 BY GRADE . . .
the grade mark (see below) is on every other link . . . your permanent grade identification.

3 BY 5′ INTERVALS . . .
Campbell "Measure-Mark" . . . color-coded every five feet for quick, exact measurement . . . saves time.

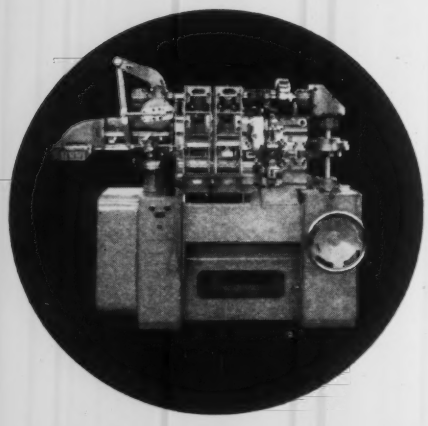
From now on when you specify any of the four grades of Campbell Chain listed below, you'll always know the make, grade and length of every piece of chain in your plant. The *grade* and *make*—your two most important safety gauges—are permanently recorded where you need them most . . . right on the chain itself! Contact your distributor or write direct for details.

CODE SPECIFICATIONS

GRADE	PERMANENT GRADE MARK	COLOR-CODE "MEASURE-MARK"
Proof Coil Chain	P	Green
BBB Chain	B	Red
High Test Steel	H	Blue
Cam-Alloy Chain	A	Orange

CAMPBELL CHAIN

CAMPBELL CHAIN Company
York, Pa.—W. Burlington, Iowa
E. Cambridge, Mass., Chicago, Ill., Portland, Ore., Seattle, Wash.
Los Angeles, Sacramento, San Francisco, Calif.
Makers of Jiffy Lug-Reinforced Tire Chains and Blue Temper pre-cut, packaged chain



VERTICALITY = SETUP TIME / 2

The big story of the important new line of Torrington vertical 4-slides is savings:

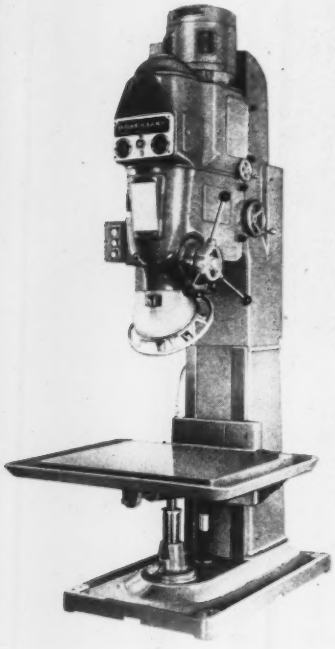
Upward of 50 percent savings in setup time, tooling costs and floor space!

On a strict cost-accounting basis, you cannot afford not to investigate the profitability of replacement with the Torrington "Vertical Line" in the cost-critical field of wire and strip forming production equipment. Full data—or a demonstration—upon request.

THE TORRINGTON MANUFACTURING COMPANY

TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA • OAKVILLE, ONTARIO

NEW PRODUCTS and equipment



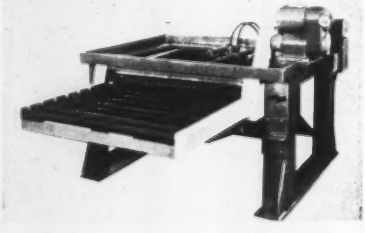
finitely variable power feeds, plus optional power indexing.

Table work surface is 28 x 32 in. The turret has six spindles with quill travel of 9 in. *Write*: Howe & Fant Inc., 20 Fitch St., East Norwalk, Conn. *Phone*: Temple 8-5561 (Tool Show Booth 1662)

Uses Magnetic Rubber

The Herr Automatic stacker and feeder, featuring Denmag rolls, is one of the first applications of this new material. Denmag is produced by compounding Neoprene or other rubber and plastic substances with various permanent magnetic materials of small particle size. It has many of the properties of a magnet.

This unit is able to stack or feed any ferrous piece from 12 x 12 in. up to 36 x 48 in., and up to 0.030 in. thick, or thicker if desired. It



A clad "sandwich" being assembled prior to hot rolling. Claymont Stainless-Clad Plates—5 to 50% stainless inseparably bonded to carbon steel backing—offer the corrosion and abrasion protection of stainless steel plus the economy of carbon steel. This is another of the many steel plate products available from Claymont's integrated mill.

by d'Arazien

CLAYMONT
STAINLESS-CLAD PLATES

CF&I

CHECK CLAYMONT FOR—Alloy Steel Plates · Carbon Steel Plates · Stainless-Clad Steel Plates High Strength Low Alloy Steel Plates · CF&I Lectro-Clad Nickel Plated Steel Plates · Pressed and Spun Steel Heads · Manhole Fittings and Covers · Fabricated Steel Products Large Diameter Welded Steel Pipe

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Here's the way to MODERNIZE your Forge Shop

Economically · Quickly

Put CECO-DROP upperworks on your board drop anvils—

For quick modernization at a minimum cost, investigate the possibility of fitting Ceco-Drop upperworks to your present board drop anvils and foundations.

You can have the benefit of all the advantages and exclusive features of the Ceco-Drop without being involved in the time and expense of replacing the anvil or disturbing the foundation.

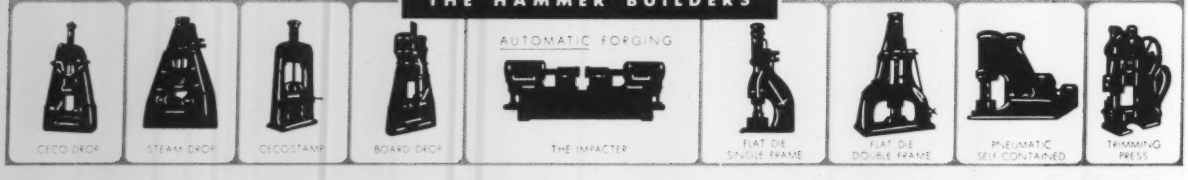
With the Ceco-Drop upperworks, you'll have improved production rates, economies in operation and operator satisfaction that will well repay the investment.

Write or phone us.

CHAMBERSBURG ENGINEERING COMPANY . . . . . CHAMBERSBURG, PA.

CHAMBERSBURG

THE HAMMER BUILDERS



does not employ pinch rolls. Consequently, it does not damage, scratch, or mar the surface finish of pieces of any shape.

When used for stacking, pieces are received and carried along the top of the entry rolls. They pass underneath the stacking rolls. Each piece is tapped lightly from above, drops down a few inches between adjustable side guides, and is stacked on the automatic lowering platform. Feeding is accomplished in reverse order.

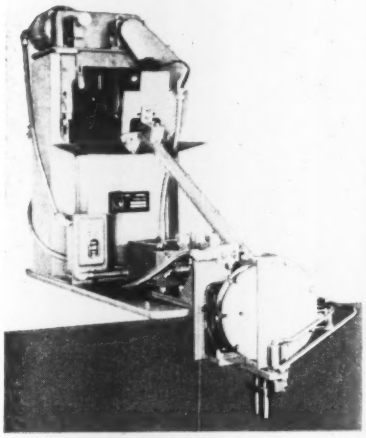
Two or more machines can be mounted in tandem, and their operation interlocked, to provide continuous operation. *Write*: Herr Equipment Co., 1428 Vine St., Warren, Ohio. *Phone*: 5958-I

Nonwoven Wiper

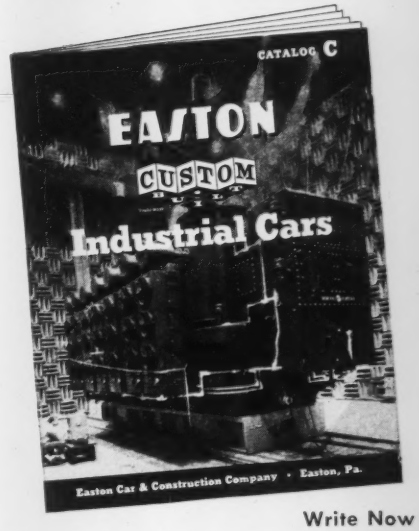
Tex-Pro Kwik-Wipe cloths serve where laundered rags and shop towels are used. They're lint-free, have high absorbency and good wet strength, and can be used several times before disposal. Made of cotton fibers, they absorb seven to eight times their weight in oil. *Write*: Dept. O-11, Textile Products, 181-189 Chestnut St., Newark 1, N. J. *Phone*: Mitchell 2-7390

Elevating Hopper

Model 5000, a high-speed feeder, has cleated elevating belt and a 1½ cu ft hopper. The roll feed, with the aid of a clearing wheel, automatically positions parts and deposits them in the feeding chute,



IDEAS for heavy duty materials handling



CUSTOM BUILT TRADEMARK

EASTON CATALOG C describes 39 different types of heavy duty EASTON industrial cars and trailers, with capacities from 2 to 500 tons, including motorized and automated units, for handling all kinds of loads.

IDEAS inspired by EASTON CATALOG C may save important time and money in your heavy handling operations.

A-1061

Write Now for Free Copy of Catalog C

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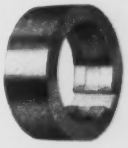
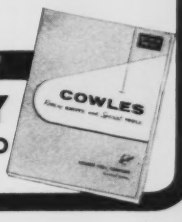


SPACER

Specify Cowles—world's largest manufacturer of rotary knives—to get more tonnage per grind, and cut production costs. Our exceedingly high standards of precision manufacture and exacting heat treatment assure utmost accuracy, efficiency and long life. Complete line including slitting, trimming and specially engineered knives, in our **Max-cut; Specialloy; Superalloy; Circle C** and **Super C** grades—also carbide knives — for any requirement. Prompt delivery. Engineering help on any job. **Let Cowles quote on your requirements.**



Write for Bulletin No. 571 Today!

COWLES TOOL COMPANY

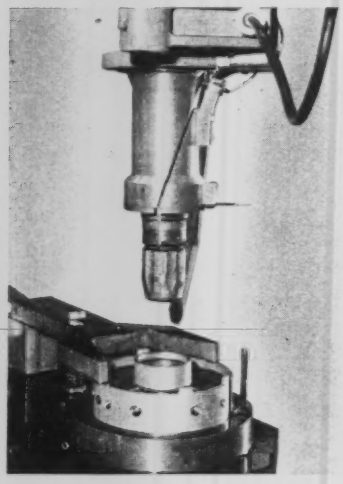
2050 WEST 110th STREET, CLEVELAND 2, OHIO

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Why MICROHONING

Provides Lower Cost— Consistent Accuracy—Maximum Production

Success of modern mass production invariably depends on complete interchangeability of parts. Thus, processing procedures that provide consistent accuracy at high production rates are required—Microhoning machines having automatic Microsize gaging assure "all parts are created equal" at a faster rate and at lower cost.



The variety of work piece and processing factors that influence automatic sizing are too diversified to be encompassed by a single gaging technique. Thousands of Microhoning applications have verified this fact. Therefore, through its continuing program of research and development, Micromatic has designed several automatic gaging devices—each provides advantages for specific types of use. Typical of features to be found in Microsize controls are the following two examples:

EXPANDING GAGE MICROSIZE

1 Gage wear held to a minimum—gage enters work collapsed.
2 Fine size adjustment through a range of .010" on diam.
3 Geometric accuracy—free-floating tool and/or part.
4 Diametric accuracy—.0003" or less.
5 No limit on maximum bore diameter to be gaged.

GAGE RING MICROSIZE

1 Simple to operate and maintain.
2 Geometric accuracy—free-floating tool and/or part.
3 Diametric accuracy—.0003" or less.
4 Gages bores from .120" to 4" diam.
5 Only honing tool enters bore—nothing to mar finish of soft surfaces.

The real answer to efficient automatic gaging is found in applying the right gaging technique to each job—it is here that Micromatic "know-how" can be of vital service to you.

Learn why Microhoning will give efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

NAME_____
TITLE_____
COMPANY_____
STREET_____
CITY_____ ZONE_____ STATE_____ K

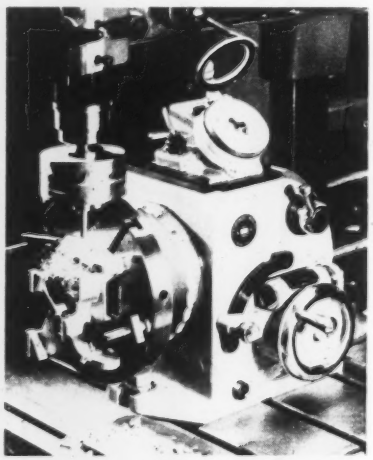
MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

NEW PRODUCTS and equipment

which delivers the parts to the production machine or work station. The feeder handles rolling forms up to 1 in. in diameter and $\frac{5}{8}$ in. long, and sliding and headed forms to $\frac{1}{2}$ in. in diameter and $1\frac{3}{4}$ in. long. *Write*: Production Feeder Corp., 3130 Johnnycake Ridge Rd., Mentor, Ohio.

Rapid Indexing

The OPL Dividing Head has an indexing accuracy of better than 10 seconds. Points may be relocated and reset as many times as desired to the same accuracy. Direction of spindle rotation can be reversed at any time during operation.



Magnified graduations are subdivided so that close readings, to $2\frac{1}{2}$ seconds, can be obtained directly. The spindle can be tilted for operation at any angle from 5 to + 90 degrees, controlled by a vernier scale reading to 1 minute. *Write*: F. T. Griswold Mfg. Co., 315 W.Lancaster Ave., Wayne, Pa.

Power Drives Fasteners

A full range of lightweight, high speed power tools to drive Hi-Lok controlled preload fasteners is now available. These tools are designed in straight, right-angle drive, offset, and extension configurations. Capacity ranges are from 3/16 to 3/8 in. diameter fasteners. *Write*: Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, Calif. *Phone*: Davenport 6-8110

NEW literature

Write directly to the company for a copy

Air Gage Cartridges

Where and how to use Plunjet air gaging cartridges in single and multiple dimension gages and inspection fixtures are detailed and illustrated in a 32-page catalog, No. PGC-58-1. Sheffield Corp., Dayton 1, Ohio, subsidiary of Bendix Aviation Corp.

Oil Specification List

A government specification product list has been made available to users of specification products in the fields of lubrication, hydraulics, and corrosion prevention. It also gives about 140 old Aeronautical (AN-), Air Force, Army, and Navy equivalents. Bray Oil Co., 3344 Medford St., Los Angeles 63, Calif.

High Speed Cutting Tools

A catalog covering an expanded line of high speed cutting tools features a cross-referenced photo index for fast tool selection. Counterbores, chucking reamers, keyseat cutters, combined drills and countersinks, center reamers, and special tools are included. Fastcut Tool Co., 7405 E. Davison, Detroit 12, Mich.

Track Maintenance

The Track Inspection Kit provides a checklist for determining the condition of railroad track installation and the specific areas which need correction or replacement. It has forms which serve as a permanent record and as requisition memos, and contains a 16-page maintenance handbook. An 11 x 18 in. card chart on track layouts is keyed to photographs. L. B. Foster Co., Box 1647, Pittsburgh 30, Pa.

Cobalt Report

"Cobalt in High-Temperature Alloys," a 12-page review, outlines the element's need in industry, and the areas requiring further research. Information is presented on cobalt production, consumption, availability, and properties (alloys are included). Cobalt Information Center, c/o Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

Composite Metal

A 32-page brochure describes the manufacture of Hortonclad, a composite metal produced by a flux-free, high strength bonding process which provides an integral and continuous bond between an alloy or special metal and its backing. A variety of available cladding and backing metals are listed. Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill.

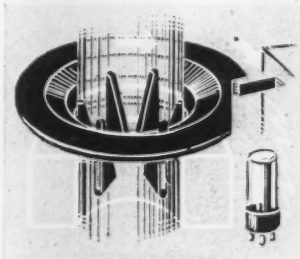
Automated Deburring

This catalog describes deburring machines ranging from low and medium volume to completely automated, high production types. Included are applications of the various deburring tools. Acme Mfg. Co., 1400 E. Nine Mile Rd., Detroit 20, Mich.

How MICROHONING Provides Lower Cost — Consistent Accuracy — Maximum Production

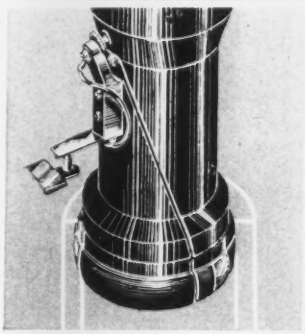
Inherent characteristics of the Microhoning process are: rapid stock removal —generation of geometric and dimensional accuracy—ability to produce any desired functional surface finish. By using automatic Microsize controls, Microhoning's economies for precision processing can be fully utilized.

Today, there are several different types of automatic Microsize gages. The type best suited for individual applications can only be determined by considering the workpiece and processing factors. How automatic cycling of Microhoning machines is accomplished by using Microsize gages is indicated by the following typical examples:



GAGE RING MICROSIZE

The gage ring, which is mounted above the workpiece, has an I.D. equal to required bore diameter. When bore has been Microhoned to size, plastic tabs on the abrasive sticks contact I.D. of gage ring causing it to turn. This movement triggers an air switch or an electronic pickup to initiate the ending of Microhoning cycle. Production-proved diametric accuracy on bores from .120" to 4" in diameter is .0003" or less.



EXPANDING GAGE MICROSIZE

This gage reciprocates in synchronization with the Microhoning tool but is not attached to it. Entering the bore on every downstroke of the tool, the gage expands only at the bottom of each stroke. When gage expands to required bore diameter, two preset electrical contacts meet and initiate the ending of Microhoning cycle. There is no limit on maximum bore diameter that can be gaged—diametric accuracy held to .0003" or less.

To most efficiently meet each automatic sizing requirement, Micromatic employs a wealth of experience in the use of air, liquid, electronic and mechanical controls.

☐ Please send me your movie "Progress in Precision" in time for showing on _____ (date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

PRECISION PRODUCTION THROUGH MICROHONING — MICROMATIC

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TITLE _____

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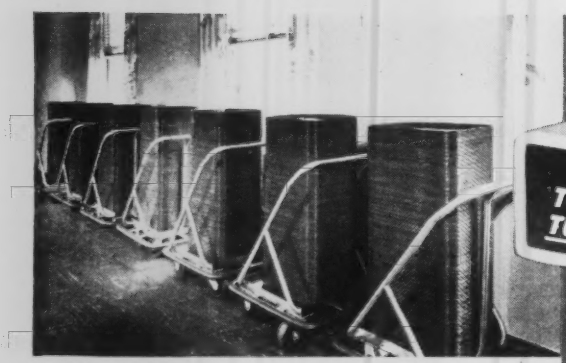
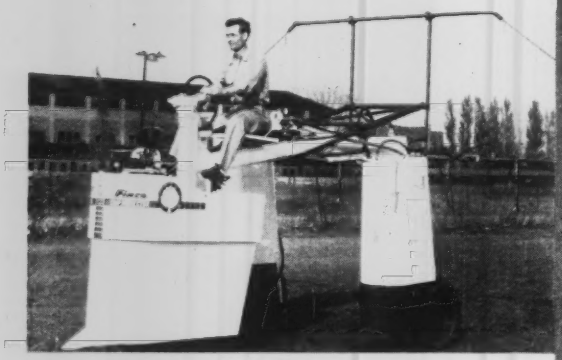
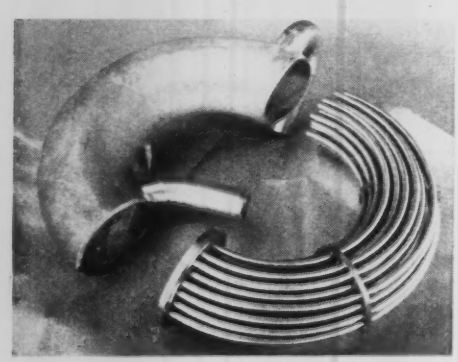


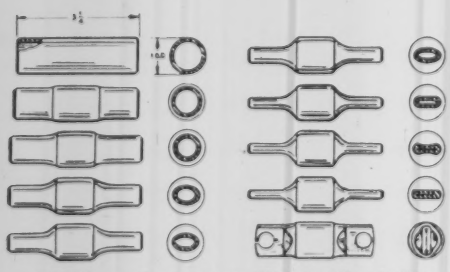
Tray carts of *welded* stainless steel tubing utilize the beauty and lasting finish of stainless—the structural advantages of tubing.



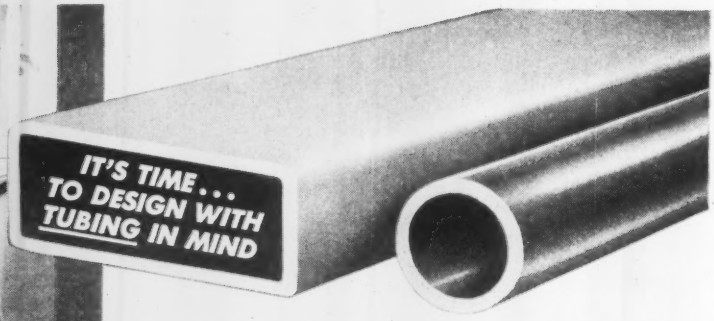
Welded steel tubing telescopes accurately in this farm equipment application—machining is not required.



For critical service in temperature and corrosion applications welded stainless steel tubing shows its merit in this cold head for nuclear equipment.



This die-pressing sequence illustrates the ductility of welded steel tubing for severe deformation requirements.



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STEEL
April 21, 1958

Market Outlook

AN UPTURN in steelmaking may be closer than most people suspect. Reason: Inventory reduction is going on at such a fast pace that unless the bottom falls out of the economy in general, consumers will be forced to come back into the market before midyear.

At the beginning of the year, the consensus of several market research men and this publication placed total steel inventories at about 19 million tons (steel in all forms except finished products in dealers' hands). Since then, metal fabricators have been consuming steel at a rate only moderately below that of a year ago. The steel production rate has been off 40.5 per cent. Result: Steel inventories were down to about 15 million tons on Apr. 1.

SCRAPING BOTTOM— Even if the trend were to continue at somewhat less than the peak of the first quarter (say 3 million tons are taken from inventory), stocks would fall to about 12 million tons by July 1. At the current rate of consumption, that is a 50 to 60 day supply, assuming a fairly even balance of metal products. But experience has shown that at such low levels, imbalance is more the rule. Imbalance should result in some increase in steel mill orders even before July 1.

PRICE SPUR— Adding to the possibility of a second quarter pickup is the probability of a steel price increase on July 1. Many consumers say they have the money to buy steel. They feel they may be able to save more on such an investment than their money will earn in a bank or in securities. To beat the price hike, they would have to start ordering in May or early June. (See STEEL, Apr. 28, for complete details).

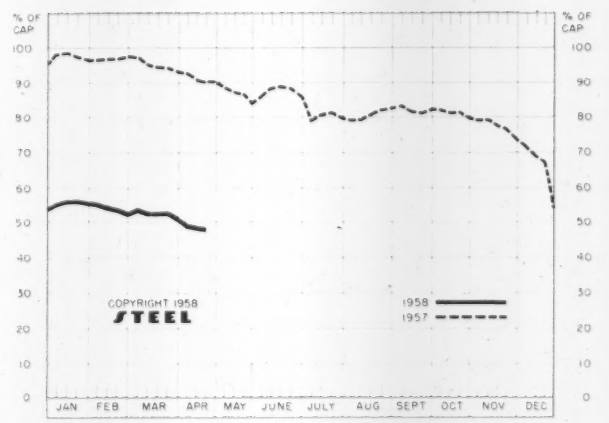
FORECAST: 91 MILLION— Noting that first quarter steel production was only 18.8 million tons (54.1 per cent of capacity), commercial research men say that second quarter tonnage could reach 21 million at most, with operations averaging 60 per cent of capacity. If the industry can turn out about 40 million tons by July 1 and run its furnaces at an average rate of 73 per cent during the second half, it will produce 91 millions tons of steel this year. Some steelmen feel this is too optimistic by as much as 10 million tons.

AUTOMOTIVE OUTLOOK— Steelmakers can expect automotive sheet buying to continue at about the March level. In late 1957, automakers ordered enough sheets to make 1.8 million cars in the first quarter. They made 1.2 million. Although they pushed back deliveries, they accumulated big inventories. At the present rate of consumption, they probably have enough sheets to last 30 days.

1959 MODELS COMING— Inquiries for the 1959 models are out, and some mills have received small orders for pilot production. Ordering in volume may begin as early as August. It should continue at a good clip through November as automakers build dealer inventories. About Dec. 1, Detroit will take a close look at sales and revise steel orders, if necessary.

INGOT RATE DROPS— Despite a seasonal pickup in construction, steelmaking continues to slide. Last week the operating rate dropped another half point to 47.5 per cent of capacity. Production was about 1,283,000 net tons of steel for ingots and castings.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Apr. 20	Change	Same 1957	Same Week 1956
Pittsburgh	50.5	+ 2*	94	104.5
Chicago	53	— 1.5*	90	101
Mid-Atlantic	49	0	95	100
Youngstown	41	— 5	90	97
Wheeling	62	— 6	85	98.5
Cleveland	24.5	— 6	90.5	95.5
Buffalo	39	0	92.5	105
Birmingham	54.5	— 1	95.5	93
New England	40	— 5	58	86
Cincinnati	48.5	+ 8*	62.5	95
St. Louis	50.5	—15	99.5	95
Detroit	12.5	— 1*.	98.5	97
Western	68	+13	101	105
National Rate	47.5	— 0.5	90	100

INGOT PRODUCTION‡

	Week Ended Apr. 20	Week Ago	Month Ago	Year Ago
INDEX (1947-49=100)	79.9†	81.4	88.2	144.0
NET TONS (In thousands)	1,283†	1,308	1,417	2,313

*Change from preceding week's revised rate. †Estimated. ‡American Iron & Steel Institute. Weekly capacity (net tons): 2,699,173 in 1958; 2,599,490 in 1957; 2,461,893 in 1956.

Metalworking Outlook—Page 51 Tool Steel Guide—Page 97

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- **TIME SAVING** . . . by eliminating "compromise speed setting" which can waste up to 50% of machining time.
- **INCREASED TOOL LIFE** . . . by using proper cutting speed. You save both tool time and money.
- **FINER FINISH** . . . with the right cut speed greatly reduces grinding required.
- **DECREASED EFFORT & ERROR** . . . preselection of cutting speeds offers another saving in operator time and effort.
- **PROVISION FOR THE FUTURE** . . . POWERSHIFT can be adapted for electronic programming or magnetic tape control.

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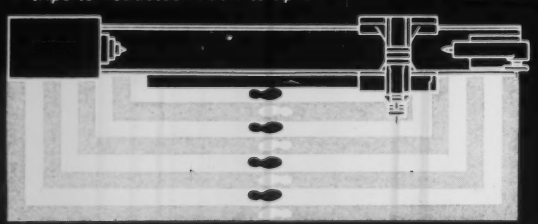
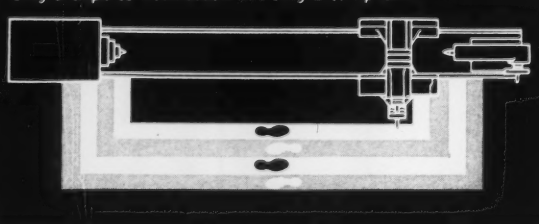


POWERSHIFT PRESELECTOR . . .
only 2 trips to headstock . . . only 2 to apron!



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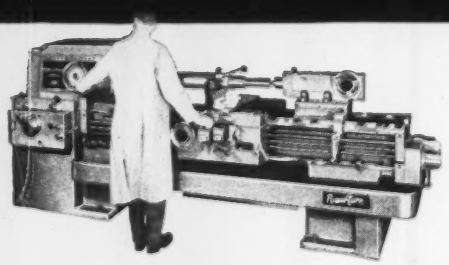
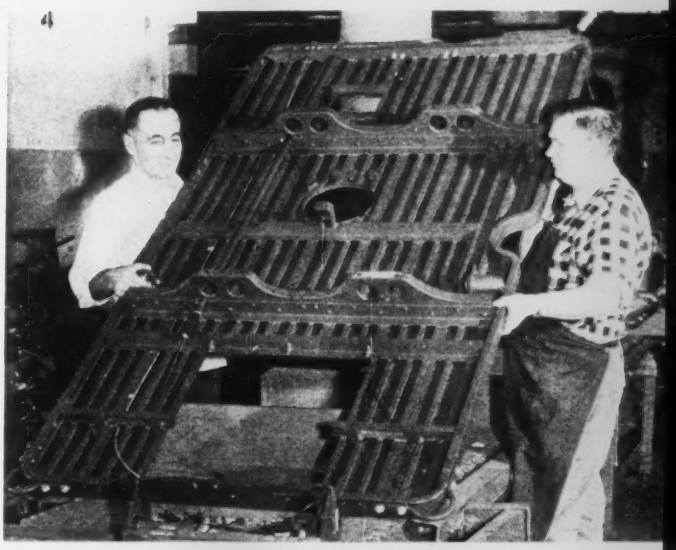


Shipments of Nonferrous Extrusions

	Aluminum* (Tons)	Magnesium** (Tons)
1958	425,000†	5,750-6,000‡
1957	394,715	5,750
1956	396,201	7,077
1955	387,546	6,255
1954	256,650	4,537
1953	225,961	5,243

*Bureau of the Census. **Bureau of Mines.
†Estimated, STEEL. ‡Estimated, Dow Chemical Co.



Magnesium extrusions serve the Army here. Seven of them, welded longitudinally, make up light (70 lb) platform of the Mechanical Mule weapon and cargo carrier

Extrusion Markets Grow

Nonferrous types have varying degrees of success. New uses are boosting shipments of aluminum extrusions toward all-time high. Magnesium ranks second in new applications

ALUMINUM is setting the pace in the nonferrous extrusion market this year. Producers think shipments may surpass the record set in 1956 by 7 per cent. They look for magnesium extrusions to have their third best year in history (1956 was the top year).

Changes in military aircraft requirements have hurt the consumption of magnesium and titanium extrusions, but some help is expected from missiles.

Trends—In applications and volume, aluminum is the fastest growing metal in the field. The popularity of curtain wall construction in multistory buildings is a boon to aluminum and bronze extrusions with special shapes. A high proportion of future construction is certain to incorporate the design.

Promising new uses for aluminum extrusions include: Electrical industry (substation structures and conduit); marine industry (penboards, stanchions, superstructures, and hatch covers); automobile industry (grilles, trim, and bumpers); mining and process industries (tubing and pipe). Athletic equipment and household accessories show a lot of potential.

The leading applications of aluminum extrusions are in architecture, the electrical industry, building construction, irrigation pipe, heat exchangers, furniture, industrial machinery, transportation, automotive trim, aircraft, missiles, and consumer durables.

Magnesium — This metal ranks second in new applications. Promising uses include missile body tubing, military vehicles, military shelters, helicopter rotary blades, aircraft propeller blades, and stator blades for automatic transmissions. Larger preformed stock is being used to make forged rings for missile frames and engine mounts.

Current important uses include: Aircraft, missile, military, and commercial vehicle parts; material handling equipment; concrete pouring forms; tools, jigs, and fixtures; radar and electronic devices; portable military shelters; and anodes for cathodic protection of water heaters.

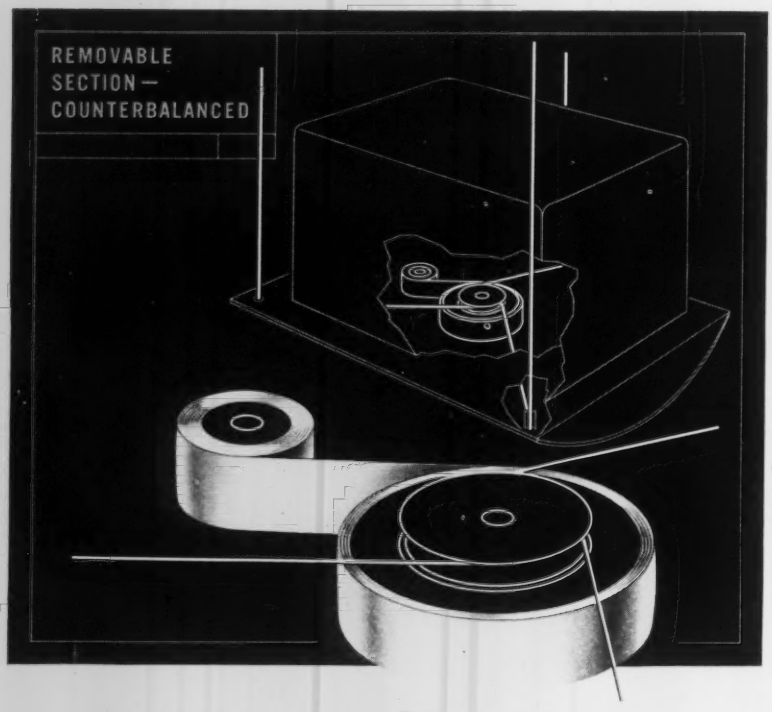
Titanium — This metal was a comer until plans for military aircraft production were drastically revised last year. But its use in hydraulic lines and ducting for advanced aircraft is still increasing.

Major uses are in jet engine assemblies and airframe structural parts. An experimental bomber, now on the drafting boards, calls for 53 extruded shapes.

An order for 7 miles of extruded seamless pressure tubing for Freeport Sulphur Co.'s nickel and cobalt processing plant blazed the trail for titanium extrusions in chemical processing—expanding uses in this industry include heat exchangers, auxiliary piping and fittings for heat exchangers, autoclaves, and allied products. The biggest gains in the civilian market are being made by this type tubing.

Copper—Makers of copper and copper-base alloy mechanical shapes enjoyed a growing market from the end of World War II until the recession hit.

The major uses of copper and



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Wind a NEG'ATOR constant-tension spring around a drum, then reverse-bend and wind the free end around a larger drum and you have a powerful, constant-torque motor.

Used as an internal counterbalance, for example, a NEG'ATOR motor offers unusual advantages over any other type of mechanism. Because it weighs only a small fraction of the force it exerts, this mechanical motor offers spectacular savings in overall weight and permits greatly simplified designs. Complete freedom is obtained in mounting and location. Working space becomes available. Massive external dead weights, tracks, guides, tubes, and complex linkages are eliminated.

The simplified illustration above resembles an actual application where a single NEG'ATOR motor with three cables on an output drum reel provides exactly balanced suspension of a 36 lb. aircraft gyro amplifier. Only a NEG'ATOR could perform this operation because of critical space and weight limitations. The gyro amplifier can be lowered as far as necessary below the fuselage for routine servicing. The entire counterbalancing unit, including NEG'ATOR, storage and output bushings, cable drum and fittings, occupies a space of only $8\frac{1}{4}$ in. x 5 in. x $2\frac{1}{2}$ in.

This is just one of many such cases where NEG'ATORS in extension spring or motor form have provided *internal* counterbalancing for floating or assisting. Other such applications and details on NEG'ATOR springs are described in Bulletin 310N. Send for your copy.

*NEG'ATORS *is a registered trade mark of Hunter Spring Company.*

HUNTER SPRING COMPANY

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Manufacturers of: Precision Springs, NEG'ATOR & FLEX'ATOR Constant-Force Springs, Stampings & Assemblies, Retriever Reels, Force Gages, and Wire Fatigue Testers

brass extrusions are in the electric, hardware, and machinery industries. Producers are counting on the bulk of new uses to stem from the design of new architectural shapes for buildings.

The Industry — More than 150 companies extrude aluminum; at least 150 make copper and copper-base extruded products; less than ten extrude titanium; and only four extrude magnesium.

Expansion will be slight in 1958 for two reasons: The recession and a temporary excess in capacity. Press manufacturers report orders for domestic installations from nonintegrated or independent extruders are meager. Considerable expansion is underway in South America and other foreign areas.

Outlook — In the foreseeable future, sales will continue to be highly competitive. The scramble for business is disturbing prices. The reduction in the price of aluminum pig will aid smaller independents, but it's too early to tell what it will do to extrusion prices. A factor favoring makers of copper and copper-base extrusions: Copper is the cheapest it has been since 1951.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 194 & 195

It looks like the automakers have made their last major purchases of steel to carry them through the 1958 model run, which is expected to wind up by the end of June.

Detroit sheet mills report even spot buying to fill inventory gaps slowed down last week; local orders for sheets and strip were almost nil.

Some mills are receiving inquiries for 1959 auto model steel. They appear to be pilot runs and are thought to indicate the motor car builders plan to get 1959 models out earlier than usual.

Pittsburgh sheetmakers say the market situation is static. Indications are April orders may fall short of average bookings the first three months. And it would not be surprising to district sales managers if sales continued to slide in May. Month-to-month changes, though, are likely to be insignificant this quarter. A seasonal surge in galvanized sheets is noted.

In the East, buying for April shows no improvement, but May bookings will be heavier, notably from diversified consumers holding

low inventories. There is little buying for inventory with prompt shipments readily available. Hot-rolled sheets and strip, cold-rolled sheets, and hot-rolled bands are available for delivery in two to three weeks. There is no price-hedge buying.

Granite City Steel resumed operation of its cold sheet mill at mid-April. It was erroneously reported in STEEL a week ago that the mill would not resume until mid-May. It was down only three weeks for repowering and is now in full production.

Plates . . .

Plate Prices, Page 193

Plate fabricating shops are drawing on inventories to meet a mild improvement in tank and miscellaneous demand. Users' stocks of universal and strip mill plates are heavy.

Sheared plate volume this month will show slight, if any, gain over that in March. Structural shops are estimating more plate girder tonnage, but heavier sizes for weldments are barely holding, with shop backlogs lower, notably in the East.

The decline in heavy industrial equipment orders is slackening demand for plate specialties, including requirements for chemical, paper mill, rubber, machine tool, and pressure vessel interests. Many small plate fabricators in the East, including warehouse shearing operations, are operating only 50 to 60 per cent of capacity.

Wire . . .

Wire Prices, Pages 195 & 196

"The bloom is off our sales of merchant wire," says a Pittsburgh producer. "Most of the stuff we're selling now was produced in the first quarter. Frankly, the seasonal pickup hasn't been what we had hoped for."

It appears the usual spring improvement in merchant products is being held down by imports at some points. Along the Atlantic seaboard, nails are reported being offered $2 to $2.50 a keg under the domestic market.

Some makers are doing better in manufacturers wire. If it weren't for the weakness in automotive buying, a Pittsburgh maker says, he would be doing just about as well as last year. He reports a brisk

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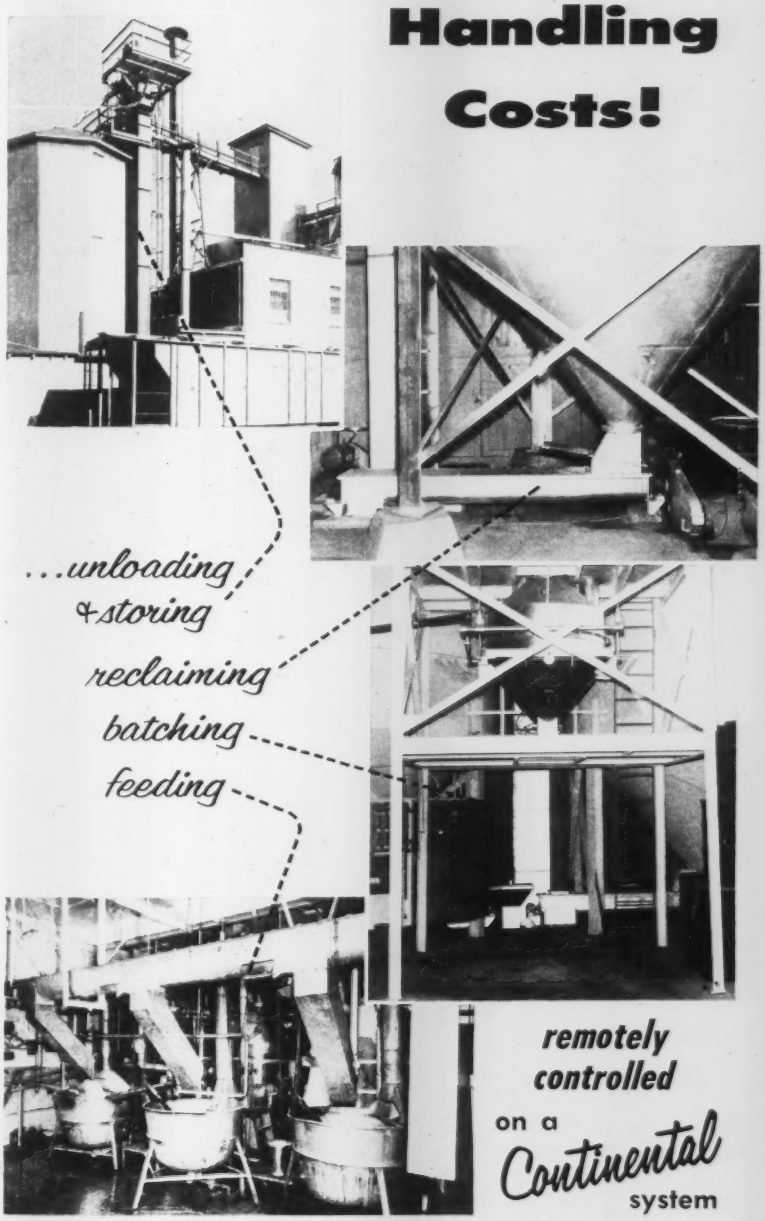

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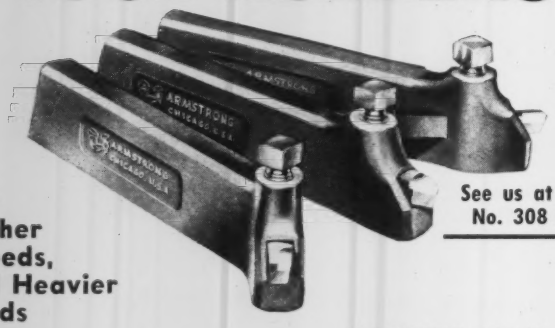

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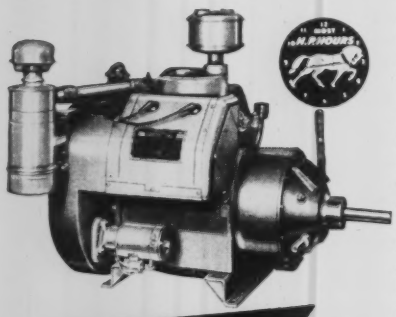

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MILWAUKEE 46, Wisconsin

market for strand and core wire, while sales of baling and basket wire are reasonably good.

In the East, wire mill operations are off several points from those of the first quarter. The primary steel production rate of some area producers is down 10 to 20 points. Rod and semifinished inventories are heavy.

Manufacturers, heading, and spring wire orders are for prompt shipment, being closely geared to short term requirements. Little building of inventory is in evidence with shipments running two to three weeks on most carbon wire industrial items.

The mills are experiencing problems in scheduling the wide variety of small-lot orders they're booking. But competition for orders centers around delivery, and this is keeping shipments well short of normal leadtime.

Reinforcing Bars . . .

Reinforcing Prices, Page 193

Concrete reinforcing steel demand is up seasonally, but the spring surge is not up to expectations at some points. Cold weather is delaying the opening up of highway and other construction.

Highway bridges and schools account for substantial tonnage. Mesh inquiry is more active.

Prices for concrete bars in place are holding in the East. The mill price to fabricators also is firm. But competition among distributors is a weak link. Close to 5000 tons were placed in New England recently, mostly under price pressure.

Steel Bars . . .

Bar Prices, Page 193

Not much change is apparent in the commercial steel bar market. April orders show a slight pickup, but total tonnage has improved little.

Auto demand continues in the doldrums, with shipments still being deferred. There has been a little pickup in buying on farm implement account. Sales to office equipment manufacturers also have been encouraging. But builders of heavy machinery are ordering little, and demand from textile mill equipment builders is poor.

Users are buying close to needs, demanding prompt shipments and

ordering little for inventory. This is true of the hot and cold rolled classifications, carbon and alloy grades. In many instances, suppliers can ship from stock.

Stainless Steel . . .

Stainless Steel Prices, Page 197

Stainless steel sales on automotive account are about on a par with carbon steel sales. One stainless producer expects a slight increase in appliance business by the end of May.

Specialty steels are slow. One maker flatly says he doesn't see any upturn in his market until after June—maybe not until July. Another supplier doesn't think things are that bad, but admits his volume is up only because of a single automotive order for 1959 model cars.

Tubular Goods . . .

Tubular Goods Prices, Page 197

"There's a glut of oil country goods downriver," says a Pittsburgh tubular goods producer. "With less than 2000 (oil) rigs operating in the Southwest, drillers are trying to reduce inventories by swapping. One company will trade drill pipe to another for tubing or casing.

"Distributors are loaded, and the swapping that's going on among their customers isn't helping them a bit. Liquidation of oil country stocks probably won't be completed for another six months."

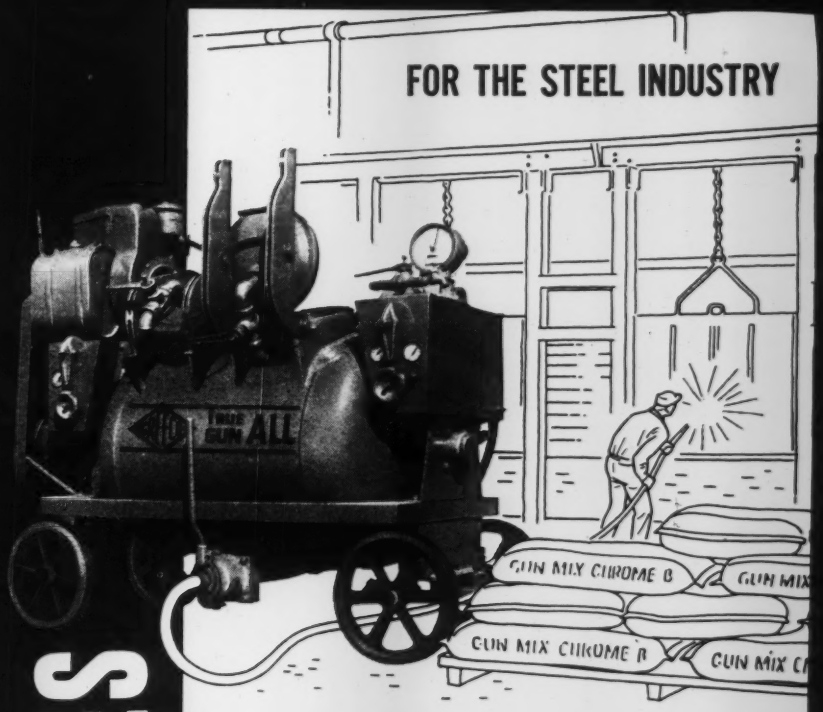
That pretty much sums up the market situation in oil country tubular goods. Last week it was learned the Tennessee Gas Transmission Co. will cut back planned 1958 construction of pipeline facilities because of the adverse ruling in the Memphis case. New construction will be limited to about 60 per cent of that approved by the Federal Power Commission.

In other areas of the tubular goods market, April buying of pressure and mechanical tubing is below that in April of the preceding year. Warehouses and boilermakers are buying small quantities of pressure tubing. Some users, though, have pushed April and May tonnage shipments back to June and July. Mechanical tubing is being bought hand to mouth.

Demand for standard pipe is expected to rise steadily as the build-

GENERAL REFRACTORIES

FOR THE STEEL INDUSTRY



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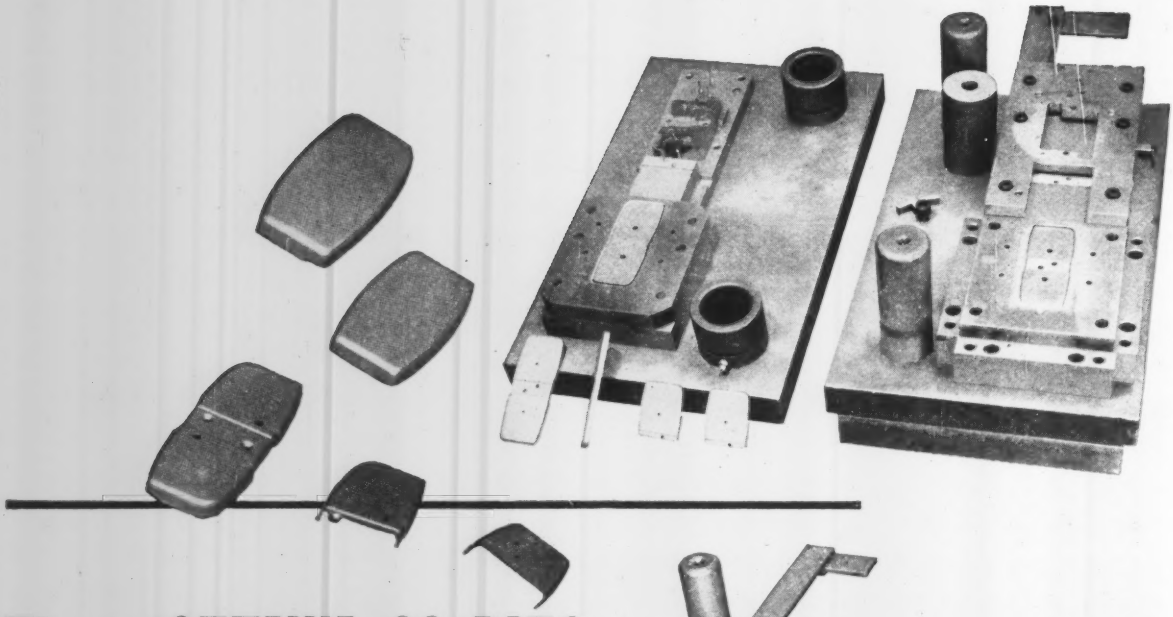

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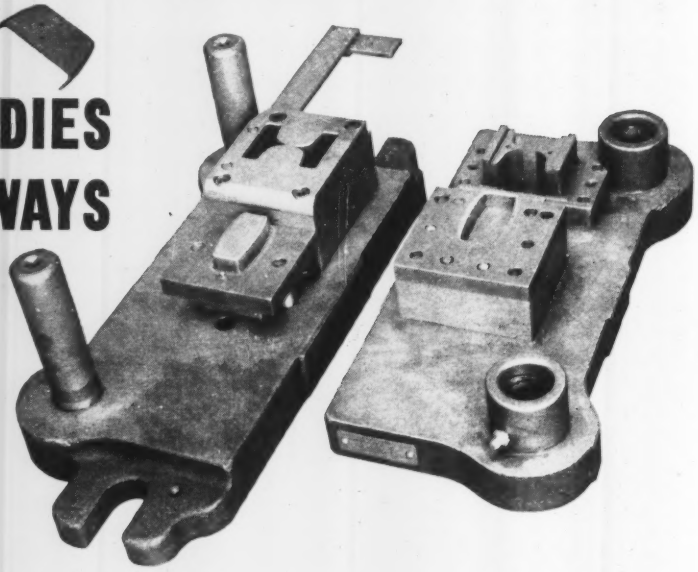
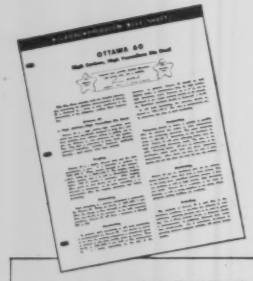
- ★ Rejects Reduced 20%
- ★ Stoning and Regrinding of Dies Reduced 75%





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One way to increase profits is to reduce finishing costs. That's what a fabricator of hearing aid cases accomplished when he switched from regular die steel to A-L's air hardening Ottawa 60 high carbon-high vanadium grade.

Ottawa 60 dies produced stainless steel cases which were free from galling and scoring—were nearly perfect as they came out of the dies. Less than half the previous buffing time was needed to bring them to the required high finish. Rejects—which ran about 20 percent before the use of Ottawa 60—were reduced almost to the point of elimination. Also, the new Ottawa 60 dies required stoning and regrinding only a quarter as often as the standard tool steel dies they replaced.

This same manufacturer has passed along significant savings to other customers through the use of Ottawa 60. By practically eliminating rejects due to corner cracking and scoring, customers receive better stamped parts at lower per-piece cost.

Let us show how you, too, can save with A-L tool steels and, at the same time, furnish your customers a better product.

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ing season gets underway. But mill backlogs are small, and deliveries (especially seamless) are available within a week or so.

March Steel Output Up

March output of ingots and steel for castings totaled 6,254,000 net tons, vs. 5,782,323 tons in February, and 10,589,074 tons in March, 1957, reports the American Iron & Steel Institute. The gain over February this year was due to the longer month.

Only 18,790,235 tons were produced in the first quarter this year, against 25,010,921 tons in the preceding three months and 31,585,042 tons in the corresponding quarter a year ago.

The Institute's index of steelmaking for March stood at 87.9 in terms of the basic index of average production for the 1947-49 period. This compared with 90 during February and 148.8 in March a year ago. The index for the first quarter was 91.0, vs. 118.5 in the final quarter of last year and 152.9 in the first quarter of 1957.

Steelmaking facilities were engaged at an average of 52.3 per cent of capacity during March, based on the Jan. 1, 1958, rating of 140,742,570 net tons. In March, 1957, when capacity was rated at 133,459,150 net tons, the ingot rate averaged 93.4 per cent.

First quarter ingot operations this year averaged 54.1 per cent, vs. 96 per cent in the like 1957 period.

Sells Sponge Iron

Introduction of sponge iron as a source of metallics for the steel industry was recently announced by Hoeganaes Sponge Iron Corp., Riverton, N. J.

Sold as 3-lb briquets, it is used as a raw material for quality steel production—primarily in acid open hearths, induction furnaces, and basic electric arc furnaces.

Pig Iron . . .

Pig Iron Prices, Page 198

Most gray iron foundries do not expect a significant improvement in demand for castings until the third quarter. They are buying pig iron on this basis and are taking shipments for only immediate needs. Most shops are melting only three to four days a week and are not pouring more than 75 per cent of capacity when operating.

One northern New York foundry is resuming operations on a limited scale after a shutdown of a couple of weeks.

The lag in pig iron demand has resulted in a widespread slowdown in blast furnace operations.

Semifinished Steel . . .

Semifinished Prices, Page 193

The national ingot rate slipped another half point last week to 47.5 per cent of capacity. At that level, production is thought to be riding the bottom, though slight fluctua-

Steel Ingot Production—March, 1958

Period	—OPEN HEARTH— Net tons	Per cent of capacity	—BESSEMER— Net tons	Per cent of capacity	—ELECTRIC— Net tons	Per cent of capacity	—TOTAL— Net tons	Per cent of capacity
1958								
January ..	6,085,124	58.6	121,338	35.5	547,440	44.8	6,753,902	56.5
*February .	5,252,112	56.0	81,597	26.4	448,614	40.6	5,782,323	53.6
†March ...	5,598,000	53.9	122,000	35.7	534,000	43.7	6,254,000	52.3
†1st Qtr. .	16,935,236	56.1	324,935	32.7	1,530,064	43.1	18,790,235	54.1
1957								
January ..	9,829,691	99.0	294,839	77.1	884,232	86.5	11,008,762	97.1
February .	8,898,671	99.2	277,682	80.4	810,853	87.8	9,987,206	97.6
March	9,442,164	95.1	275,156	71.9	871,754	85.2	10,589,074	93.4
1st Qtr. ..	28,170,526	97.7	847,677	76.3	2,566,839	86.4	31,585,042	96.0
April	8,820,328	91.8	231,731	62.6	762,721	77.1	9,814,780	89.5
May	8,842,707	89.1	201,864	52.8	747,752	73.1	9,792,323	86.4
June	8,498,903	88.4	210,915	57.0	681,584	68.9	9,391,402	85.6
2nd Qtr. ..	26,161,938	89.8	644,510	57.4	2,192,057	73.0	28,998,505	87.2
1st 6 Mo. .	54,332,464	93.7	1,492,187	66.8	4,758,896	79.7	60,583,547	91.5
July	8,086,519	81.4	194,638	50.9	627,575	61.4	8,908,732	78.6
August	8,297,172	83.6	204,723	53.5	731,995	71.6	9,233,890	81.5
September..	8,135,139	84.7	185,967	50.2	656,800	66.4	8,977,906	81.8
3rd Qtr. ..	24,518,830	83.2	585,328	51.5	2,016,370	66.4	27,120,528	80.6
9 Mo. ...	78,851,294	90.2	2,077,515	61.7	6,775,266	75.2	87,704,075	87.9
October ..	8,348,522	84.1	154,577	40.4	694,618	67.9	9,197,717	81.1
November .	7,674,698	79.9	134,709	36.4	583,512	59.0	8,392,919	76.5
December .	6,783,262	68.3	108,237	28.3	528,686	51.7	7,420,285	65.5
4th Qtr. ..	22,806,482	77.4	397,623	35.0	1,806,816	59.5	25,010,921	74.4
2nd 6 Mo..	47,325,312	80.3	982,951	43.3	3,823,186	63.0	52,131,449	77.5
Total 101,657,776		87.0	2,475,138	54.9	8,582,082	71.3	112,714,996	84.5

Note—The percentages of capacity operated are based on annual capacities as of Jan. 1, 1958, as follows: Open hearth 122,321,830 net tons; bessemer 4,027,000 net tons; oxygen process, electric and crucible 14,398,740 net tons. Total for 1958, 140,742,570 net tons. For 1957, the capacity tonnages are: Open hearth 116,912,410 net tons; bessemer 4,505,000 net tons; oxygen process, electric and crucible 12,041,740 net tons. Total for 1957, 133,459,150 net tons.

*Revised.

†Preliminary.

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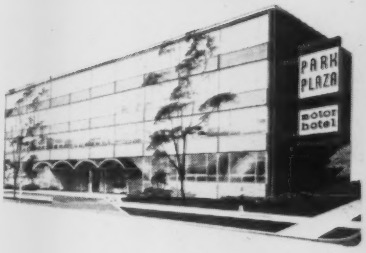

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tions over the coming weeks are anticipated.

"Our forecast for April is up from March," reports a Pittsburgh producer. "Sales to rerollers are better than to forgers, whose buying closely parallels automotive production. Forgers who supply farm implement makers are ordering at a fairly good rate."

Generally, no substantial pickup in semifinished sales is anticipated before September. But Allison R. Maxwell Jr., president, Pittsburgh Steel Co., told stockholders of his company that the steel industry may have passed the low point in demand.

Wheeling Steel's vice president-sales, William M. Hall, sees an improved marketing picture in May and June. He notes improvement in the market for pipe.

Warehouse . . .

Warehouse Prices, Page 198

Distributors show little enthusiasm over prospects for any substantial improvement in demand for steel until the fourth quarter. They point out that the summer months are usually dull. They are pinning their hopes on a gradual upturn after Labor Day and expect that the final quarter of the year will witness a strong comeback for steel.

Some warehouses are receiving larger inquiry for structurals, plates, and other building items, but the seasonal gain is not as marked as normal.

Some price cutting is noted in the Southwest, although published prices remain unchanged.

Structural Shapes . . .

Structural Shape Prices, Page 193

Competition for new jobs, improved fabricated steel deliveries, and ample plain material supplies tend to keep the structural market under price pressure. Demand is somewhat improved seasonally, but there hasn't been sufficient bulge in requirements to materially alter the easy market situation that has prevailed in recent months.

Heavier bridge inquiry includes 13,500 tons for the lower level deck of the George Washington Bridge, New York. Closing Apr. 24, New York state projects call for 8000 tons.

Estimated active tonnage in the Mid-Atlantic and New England areas approximates 35,000 tons. Airport terminal building volume is heavier, including one contract for 4000 tons.

The decline in structural steel volume is largely in industrial construction. More fabricating shops are estimating bridge tonnage, some of them that normally only bid on building jobs.

Steel Product Shipments—February, 1958

(Net tons, all grades)

Products	Carbon	Alloy	Stainless	Total First Two Months 1958	1957
Ingots, etc.	10,527	10,129	1,559	46,437	92,197
Blooms, slabs, etc.	74,582	19,005	920	207,540	403,961
Tube rounds	567	128	.....	1,303	16,359
Skelp	5,977	.....	.....	11,512	44,778
Wire rods	59,288	1,115	358	123,417	183,158
Structurals (heavy)	267,488	3,614	10	719,785	1,063,419
Steel piling	24,563	.....	.....	59,855	91,984
Plates	397,755	34,947	2,009	958,388	1,539,981
Rails (standard)	40,614	.....	.....	95,786	232,589
Rails (all other)	3,288	.....	.....	6,404	16,889
Joint bars	3,425	.....	.....	6,314	13,721
Tie plates	11,478	.....	.....	20,459	56,443
Track spikes	2,828	.....	.....	6,445	13,298
Wheels	18,694	24	.....	40,625	63,990
Axles	10,120	.....	.....	24,425	34,993
Bars (hot rolled)	301,453	80,533	2,891	853,796	1,515,292
Bars (reinforcing)	106,600	.....	.....	224,803	459,342
Bars (cold drawn)	61,497	10,191	2,946	163,795	271,179
Tool steel	632	4,997	.....	12,178	18,639
Standard pipe	137,706	28	1	305,296	510,987
Oil country goods	78,129	22,971	.....	248,700	525,562
Line pipe	203,120	.....	.....	431,574	665,718
Mechanical tubing	30,355	13,444	237	92,520	161,945
Pressure tubing	17,275	3,371	1,674	45,392	79,787
Drawn wire	148,816	2,751	1,497	334,935	464,420
Nails & staples	28,131	.....	1	60,328	76,390
Barbed wire	4,827	.....	.....	9,200	11,507
Woven fence	14,473	.....	.....	29,041	42,970
Bale ties, etc.	3,009	.....	.....	4,498	5,785
Black plate	47,972	.....	.....	101,214	126,964
Tin plate—HD	29,451	.....	.....	60,906	151,214
Tin plate—electro	397,861	.....	.....	872,220	899,510
Sheets (hot rolled)	417,342	14,904	2,901	945,044	1,577,699
Sheets (cold rolled)	692,322	2,402	7,351	1,575,411	2,314,973
Sheets (galvanized)	167,627	.....	.....	354,276	440,944
Sheets (other coated)	12,005	.....	.....	28,504	36,896
Elec. Sheets—strip	3,267	32,483	.....	74,059	124,186
Strip (hot rolled)	64,410	1,210	631	149,038	295,047
Strip (cold rolled)	68,368	1,677	10,183	173,331	231,413
Total (1958)	3,967,842	259,924	35,169	9,478,754	.....
Total (1957)	6,582,506	425,051	59,175	.....	14,876,129

Data from the American Iron & Steel Institute, New York.

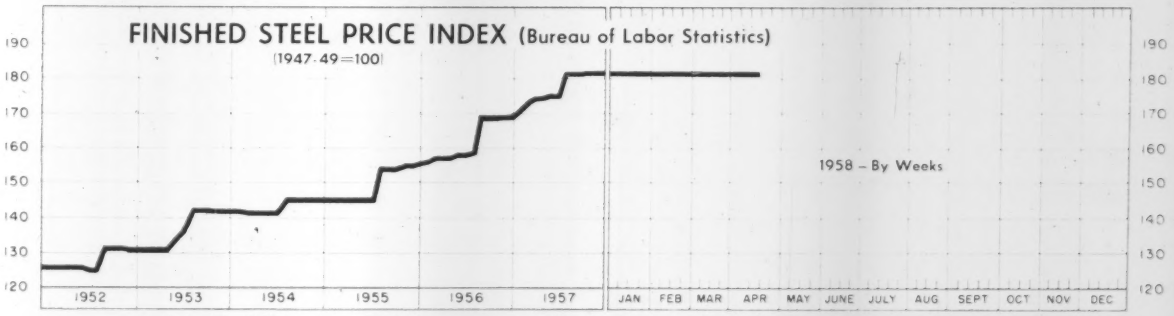
Steel Shipments by Markets—February, 1958

(Net tons, all grades)

Markets:	February Tonnages 1958	1957	Total First Two Months 1958	1957
Converting, processing	202,411	300,926	427,187	626,691
Forgings (except auto)	57,856	105,309	120,841	219,557
Bolts, nuts, etc.	54,553	118,704	125,810	250,952
Warehouses:				
Oil & gas industry	74,131	231,919	191,044	457,600
All other	443,871	1,125,422	1,310,742	2,379,719
Total warehouse	679,998	1,357,341	1,501,786	2,837,319
Construction:				
Rail transportation	3,156	8,796	6,905	13,927
Oil & Gas	143,592	245,912	309,469	534,372
All other	443,871	742,500	1,028,403	1,481,864
Total construction	590,619	997,208	1,344,777	2,030,163
Contractors' products	234,389	297,945	486,650	626,052
Automotive:				
Cars, trucks, etc.	710,081	1,295,362	1,669,965	2,764,614
Forgings	18,058	31,677	43,959	66,250
Total automotive	728,139	1,327,039	1,713,924	2,830,864
Rail Transportation:				
Rails, trackwork, etc.	53,272	149,479	124,068	310,828
Cars, locomotives, etc.	89,299	231,616	197,209	483,903
Streetcars, etc.	843	2,404	1,681	5,524
Total transportation	143,414	383,499	322,958	800,255
Shipbuilding, etc.	69,279	76,255	165,238	169,709
Aircraft	3,677	11,167	8,276	23,179
Oil & gas drilling	27,293	71,059	67,116	146,721
Mining, quarrying, etc.	13,705	25,439	28,168	54,245
Agricultural:				
Machinery	71,065	79,917	154,114	165,406
All other	14,239	14,332	26,829	29,718
Total agricultural	85,304	94,249	180,943	195,124
Machinery, tools, etc.	238,632	424,511	527,852	891,140
Elec. Machinery, etc.	135,713	187,431	282,770	406,868
Appliances, etc.	107,208	151,869	237,309	323,753
Other domestic equipment	123,122	166,192	257,732	349,740
Containers:				
Cans & closures	412,432	427,693	896,588	940,368
Barrels, drums, etc.	47,477	70,846	102,556	155,554
All other	32,379	56,233	67,561	116,228
Total containers	492,288	554,772	1,066,705	1,212,150
Ordance, etc.	18,176	40,533	33,641	77,857
Nonreported shipments	47,341	74,940	105,258	155,251
Total domestic shipments	4,053,117	6,766,388	9,004,941	14,227,590
Exports	209,818	300,344	473,813	648,539
Total shipments	4,262,935	7,066,732	9,478,754	14,876,129

Data from the American Iron & Steel Institute.

Price Indexes and Composites



Apr. 15, 1958	Week Ago	Month Ago	Mar. Avg	Year Ago
181.6	181.6	181.6	181.6	174.0

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Apr. 15

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.600	Bars, Reinforcing	6.135
Rails, Light, 40 lb	7.067	Bars, C.F., Carbon	10.360
Tie Plates	6.600	Bars, C.F., Alloy	13.875
Axles, Railway	9.825	Bars, C.F., Stainless, 302 (lb)	0.553
Wheels, Freight Car, 33 in. (per wheel)	60.000	Sheets, H.R., Carbon	6.192
Plates, Carbon	6.150	Sheets, C.R., Carbon	7.089
Structural Shapes	5.942	Sheets, Galvanized	8.270
Bars, Tool Steel, Carbon (lb)	0.535	Sheets, C.R., Stainless, 302 (lb)	0.688
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.650	Sheets, Electrical	12.025
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.355	Strip, C.R., Carbon	9.243
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.850	Strip, C.R., Stainless, 430 (lb)	0.493
Bars, H.R., Alloy	10.525	Strip, H.R., Carbon	6.095
Bars, H.R., Stainless, 303 (lb)	0.525	Pipe, Black, Buttweld (100 ft)	19.814
Bars, H.R., Carbon	6.425	Pipe, Galv., Buttweld (100 ft)	23.264
		Pipe, Line (100 ft)	199.023
		Casing, Oil Well, Carbon (100 ft)	194.499
		Casing, Oil Well, Alloy (100 ft)	304.610
Tubes, Boiler (100 ft)	49.130	Black Plate, Canmaking Quality (95 lb base box)	7.583
Tubing, Mechanical, Carbon (100 ft)	24.953	Wire, Drawn, Carbon	10.225
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608	Wire, Drawn, Stainless, 430 (lb)	0.653
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	9.783	Bale Ties (bundles)	7.967
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.483	Nails, Wire, 8d Common	9.828
		Wire, Barbed (80-rod spool)	8.719
		Woven Wire Fence (20-rod roll)	21.737

STEEL's FINISHED STEEL PRICE INDEX*

	Apr. 16 1958	Week Ago	Month Ago	Year Ago	5Yr Ago
Index (1935-39 avg=100)	239.15	239.15	239.15	227.41	181.31
Index in cents per lb	6.479	6.479	6.479	6.161	4.912

STEEL's ARITHMETICAL PRICE COMPOSITES*

	Apr. 16 1958	Week Ago	Month Ago	Year Ago	5Yr Ago
Finished Steel, NT	$145.42	$145.42	$145.42	$139.71	$110.98
No. 2 Fdry Pig Iron, GT	66.49	66.49	66.49	64.70	55.04
Basic Pig Iron, GT	65.99	65.99	65.99	64.23	54.66
Malleable Pig Iron, GT	67.27	67.27	67.27	65.77	55.77
Steelmaking Scrap, GT	33.50	34.17	36.33	42.67	43.42

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Apr. 16 1958	Week Ago	Month Ago	Year Ago	5Yr Ago
Bars, H.R., Pittsburgh	5.425	5.425	5.425	5.075	3.95
Bars, H.R., Chicago	5.425	5.425	5.425	5.075	3.95
Bars, H.R., deld Philadelphia	5.725	5.725	5.725	5.365	4.502
Bars, C.F., Pittsburgh	7.30*	7.30*	7.30*	6.85*	4.925
Shapes, Std., Pittsburgh	5.275	5.275	5.275	5.00	3.85
Shapes, Std., Chicago	5.275	5.275	5.275	5.00	3.85
Shapes, deld., Philadelphia	5.545	5.545	5.545	5.31	4.13
Plates, Pittsburgh	5.10	5.10	5.10	4.85	3.90
Plates, Chicago	5.10	5.10	5.10	4.85	3.90
Plates, Coatesville, Pa.	5.10	5.10	5.10	5.25	4.35
Plates, Sparrows Point, Md.	5.10	5.10	5.10	4.85	3.90
Plates, Claymont, Del.	5.10	5.10	5.10	5.70	4.35
Sheets, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.775
Sheets, H.R., Chicago	4.925	4.925	4.925	4.675	3.775
Sheets, C.R., Pittsburgh	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Chicago	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Detroit	6.05-6.15	6.05-6.15	6.05-6.15	5.75-5.85	4.775
Sheets, Galv., Pittsburgh	6.60	6.60	6.60	6.30	5.075
Strip, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.975-4.225
Strip, H.R., Chicago	4.925	4.925	4.925	4.675	3.725
Strip, C.R., Pittsburgh	7.15	7.15	7.15	6.85	5.10-5.80
Strip, C.R., Chicago	7.15	7.15	7.15	6.85	5.35
Strip, C.R., Detroit	7.25	7.25	7.25	6.95	5.30-6.05
Wire, Basic, Pittsburgh	7.65	7.65	7.65	7.20	5.225-5.475
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.49	6.35
Tin plate (1.50 lb) box, Pitts.	$10.30	$10.30	$10.30	$9.95	$8.95

*Including 0.35c for special quality.

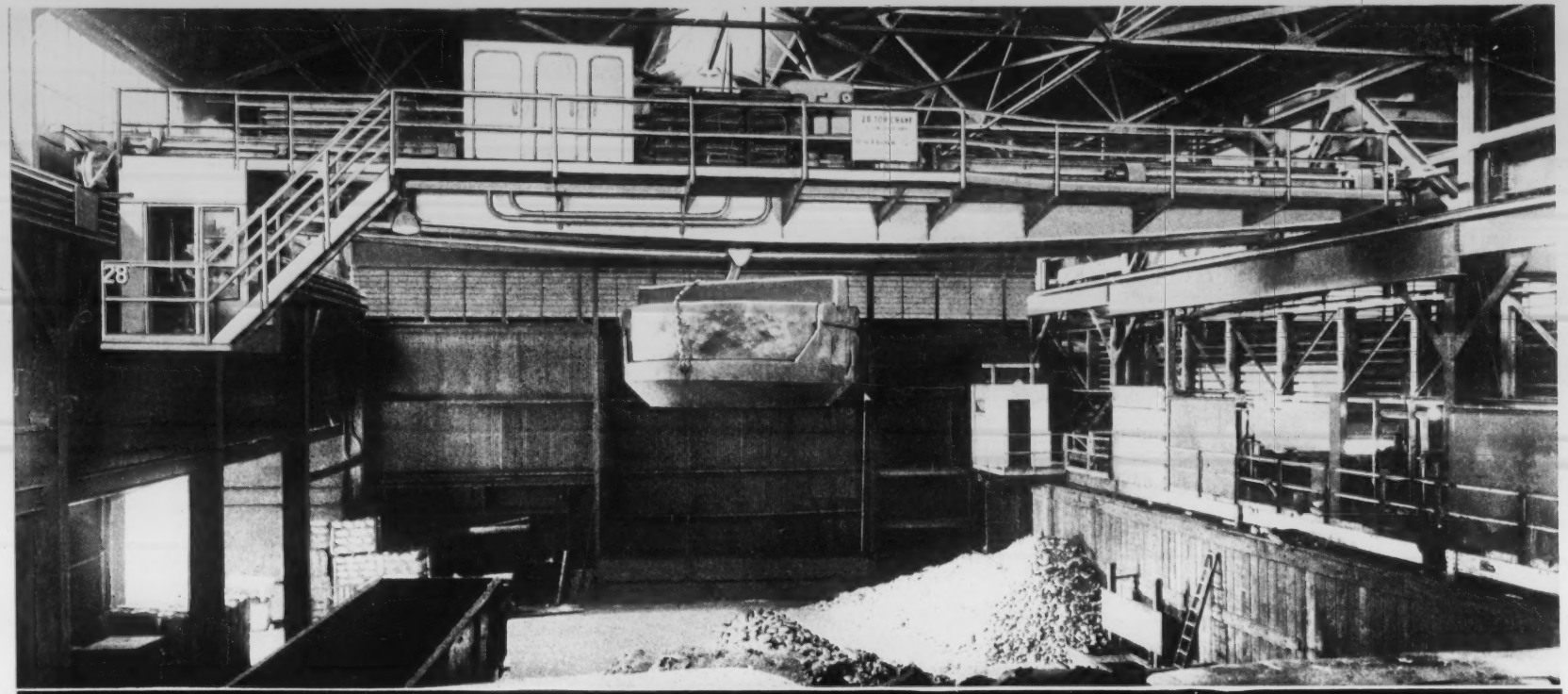
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$96.00	$96.00	$96.00	$91.50	$70.50
Wire rods, ⅜-⅝" Pitts.	6.15	6.15	6.15	5.80	4.425

PIG IRON, Gross Ton	Apr. 16 1958	Week Ago	Month Ago	Year Ago	5Yr Ago
Bessemer, Pitts.	$67.00	$67.00	$67.00	$65.50	$55.50
Basic, Valley	66.00	66.00	66.00	64.50	54.50
Basic, deld., Phila.	70.41	70.41	70.41	68.38	59.25
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	65.00	55.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	65.00	55.00
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	68.88	59.75
No. 2 Fdry, Birm.	62.50	62.50	62.50	59.00	51.38
No. 2 Fdry (Birm.) deld. Cin.	70.20	70.20	70.20	66.70	58.93
Malleable, Valley	66.50	66.50	66.50	65.00	55.00
Malleable, Chicago	66.50	66.50	66.50	65.00	55.00
Ferromanganese, Duquesne.	245.00†	245.00†	245.00†	255.00†	228.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$33.50	$33.50	$36.50	$41.50	$44.00
No. 1 Heavy Melt, E. Pa.	37.00	38.00	38.50	46.00	43.50
No. 1 Heavy Melt, Chicago	30.00	31.00	34.00	40.50	42.75
No. 1 Heavy Melt, Valley	32.50	33.50	37.50	41.50	42.75
No. 1 Heavy Melt, Cleve.	29.50	30.50	33.50	38.50	42.75
No. 1 Heavy Melt, Buffalo	28.50	28.50	28.50	41.50	45.50
Rails, Rerolling, Chicago	53.50	53.50	54.50	56.50	52.00
No. 1 Cast, Chicago	38.50	38.50	41.50	39.50	42.00

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.25	$15.25	$15.25	$15.25	$14.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.00	17.00



VICTOR R. BROWNING

Mill Type Cranes

TO SPECIFICATION...

Basically designed as required by A.I.S.E. specifications, mill type cranes built by Victor R. Browning & Co., Inc. also offer the opportunity of specifying preferences and standards prevailing in the purchaser's plant. May we have your next inquiry?

VICTOR R. BROWNING & COMPANY, Inc.

WILLOUGHBY (CLEVELAND), OHIO

DESIGNERS AND BUILDERS OF ELECTRIC OVERHEAD TRAVELING CRANES AND HOISTS AND ELECTRIC REVOLVING CRANES

Steel Prices

Mill prices as reported to STEEL, Apr. 16, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 194; to footnotes, page 196.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 ..... $73.50

INGOTS, Alloy (NT)

Detroit S41 ..... $77.00
Farrell,Pa. S3 ..... 77.00
Lowellville,O. S3 ..... 77.00
Midland,Pa. C18 ..... 77.00
Munhall,Pa. U5 ..... 77.00
Sharon,Pa. S3 ..... 77.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Bessemer,Pa. U5 ..... $77.50
Buffalo R2 ..... 77.50
Clairton,Pa. U5 ..... 77.50
Ensley,Ala. T2 ..... 77.50
Fairfield,Ala. T2 ..... 77.50
Fontana,Calif. K1 ..... 88.00
Gary,Ind. U5 ..... 77.50
Johnstown,Pa. B3 ..... 77.50
Lackawanna,N.Y. B2 ..... 77.50
Munhall,Pa. U5 ..... 77.50
Owensboro,Ky. G8 ..... 77.50
S.Chicago,Ill. R2, U5 ..... 77.50
S.Duquesne,Pa. U5 ..... 77.50
Sterling,Ill. N15 ..... 77.50
Youngstown R2 ..... 77.50

Carbon, Forging (NT)

Bessemer,Pa. U5 ..... $96.00
Buffalo R2 ..... 96.00
Canton,O. R2 ..... 98.50
Clairton,Pa. U5 ..... 96.00
Conshohocken,Pa. A3 ..... 101.00
Ensley,Ala. T2 ..... 96.00
Fairfield,Ala. T2 ..... 96.00
Fontana,Calif. K1 ..... 105.50
Gary,Ind. U5 ..... 96.00
Geneva,Utah C11 ..... 96.00
Houston S5 ..... 101.00
Johnstown,Pa. B2 ..... 96.00
Lackawanna,N.Y. B2 ..... 96.00
LosAngeles B3 ..... 105.50
Midland,Pa. C18 ..... 96.00
Munhall,Pa. U5 ..... 96.00
Owensboro,Ky. G8 ..... 96.00
Seattle B3 ..... 109.50
Sharon,Pa. S3 ..... 96.00
S.Chicago R2, U5, W14 ..... 96.00
S.Duquesne,Pa. U5 ..... 96.00
S.SanFrancisco B3 ..... 105.50
Warren,O. C17 ..... 96.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..... $114.00
Bridgeport,Conn. C32 ..... 114.00
Buffalo R2 ..... 114.00
Canton,O. R2, T7 ..... 114.00
Conshohocken,Pa. A3 ..... 121.00
Detroit S41 ..... 114.00
Economy,Pa. B14 ..... 114.00
Farrell,Pa. S3 ..... 114.00
Fontana,Calif. K1 ..... 135.00
Gary,Ind. U5 ..... 114.00
Houston S5 ..... 119.00
Ind.Harbor,Ind. Y1 ..... 114.00
Johnstown,Pa. B2 ..... 114.00
Lackawanna,N.Y. B2 ..... 114.00
LosAngeles B3 ..... 134.00
Lowellville,O. S3 ..... 114.00
Massillon,O. R2 ..... 114.00
Midland,Pa. C18 ..... 114.00
Munhall,Pa. U5 ..... 114.00
Owensboro,Ky. G8 ..... 114.00
Sharon,Pa. S3 ..... 114.00
S.Chicago R2,U5,W14 ..... 114.00
S.Duquesne,Pa. U5 ..... 114.00
Struthers,O. Y1 ..... 114.00
Warren,O. C17 ..... 114.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 ..... $117.50
Canton,O. R2 ..... 120.00
Cleveland R2 ..... 117.50
Gary,Ind. U5 ..... 117.50
S.Chicago,Ill. R2, W14 ..... 117.50
S.Duquesne,Pa. U5 ..... 117.50
Warren,O. C17 ..... 117.50

SKELP

Aliquippa,Pa. J5 ..... 5.075
Munhall,Pa. U5 ..... 4.875
Pittsburgh J5 ..... 5.075
Warren,O. R2 ..... 4.875
Youngstown R2, U5 ..... 4.875

WIRE RODS

AlabamaCity,Ala. R2 ..... 6.15
Aliquippa,Pa. J5 ..... 6.15
Alton,Ill. L1 ..... 6.35
Buffalo W12 ..... 6.15
Cleveland A7 ..... 6.15
Donora,Pa. A7 ..... 6.15
Fairfield,Ala. T2 ..... 6.15
Houston S5 ..... 6.40
IndianaHarbor,Ind. Y1 ..... 6.15
Johnstown,Pa. B2 ..... 6.15
Joliet,Ill. A7 ..... 6.15
KansasCity,Mo. S5 ..... 6.40
Kokomo,Ind. C16 ..... 6.25
LosAngeles B3 ..... 6.95
Minnequa,Colo. C10 ..... 6.40
Monessen,Pa. P7 ..... 6.15
N.Tonawanda,N.Y. B11 ..... 6.15
Pittsburg,Calif. C11 ..... 6.95
Portsmouth,O. P12 ..... 6.15
Roebling,N.J. R5 ..... 6.25
S.Chicago,Ill. R2 ..... 6.15
SparrowsPoint,Md. B2 ..... 6.25
Sterling,Ill.(1) N15 ..... 6.15
Sterling,Ill. N15 ..... 6.25
Struthers,O. Y1 ..... 6.15
Worcester,Mass. A7 ..... 6.45

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ..... 5.275
Atlanta A11 ..... 5.475
Aliquippa,Pa. J5 ..... 5.275
Bessemer,Ala. T2 ..... 5.275
Bethlehem,Pa. B2 ..... 5.325
Birmingham C15 ..... 5.275
Clairton,Pa. U5 ..... 5.275
Fairfield,Ala. T2 ..... 5.275
Fontana,Calif. K1 ..... 6.075
Gary,Ind. U5 ..... 5.275
Geneva,Utah C11 ..... 5.275
Houston S5 ..... 5.375
Ind.Harbor,Ind. I-2 ..... 5.275
Johnstown,Pa. B2 ..... 5.325
Joliet,Ill. P22 ..... 5.275
KansasCity,Mo. S5 ..... 5.375
Lackawanna,N.Y. B2 ..... 5.325
LosAngeles B3 ..... 5.975
Minnequa,Colo. C10 ..... 5.575
Munhall,Pa. U5 ..... 5.275
Niles,Calif. P1 ..... 5.625
Phoenixville,Pa. P4 ..... 5.325
Portland,Oreg. O4 ..... 6.025
Seattle B3 ..... 6.025
S.Chicago,Ill. U5, W14 ..... 5.275
S.SanFrancisco B3 ..... 5.925
Sterling,Ill. N15 ..... 5.275
Torrance,Calif. C11 ..... 5.975
Weirton,W.Va. W6 ..... 5.275

Wide Flange

Bethlehem,Pa. B2 ..... 5.325
Clairton,Pa. U5 ..... 5.275
Fontana,Calif. K1 ..... 6.225
IndianaHarbor,Ind. I-2 ..... 5.275
Lackawanna,N.Y. B2 ..... 5.325
Munhall,Pa. U5 ..... 5.275
Phoenixville,Pa. P4 ..... 5.325
S.Chicago,Ill. U5 ..... 5.275
Weirton,W.Va. W6 ..... 5.275

Alloy Std. Shapes

Aliquippa,Pa. J5 ..... 6.55
Clairton,Pa. U5 ..... 6.55
Gary,Ind. U5 ..... 6.55
Houston S5 ..... 6.65
KansasCity,Mo. S5 ..... 6.65
Munhall,Pa. U5 ..... 6.55
S.Chicago,Ill. U5 ..... 6.55

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 ..... 7.75
Bessemer,Ala. T2 ..... 7.75
Bethlehem,Pa. B2 ..... 7.80
Clairton,Pa. U5 ..... 7.75
Fairfield,Ala. T2 ..... 7.75
Fontana,Calif. K1 ..... 8.55
Gary,Ind. U5 ..... 7.75
Geneva,Utah C11 ..... 7.75
Houston S5 ..... 7.85
Ind.Harbor,Ind. I-2, Y1 ..... 7.75
Johnstown,Pa. B2 ..... 7.80
KansasCity,Mo. S5 ..... 7.85
Lackawanna,N.Y. B2 ..... 7.80
LosAngeles B3 ..... 8.45
Munhall,Pa. U5 ..... 7.75
Seattle B3 ..... 8.50
S.Chicago,Ill. U5, W14 ..... 7.75
S.SanFrancisco B3 ..... 8.40
Struthers,O. Y1 ..... 7.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 ..... 7.80
Lackawanna,N.Y. B2 ..... 7.80
Munhall,Pa. U5 ..... 7.75
S.Chicago,Ill. U5 ..... 7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 ..... 5.325
Lackawanna,N.Y. B2 ..... 5.325
Munhall,Pa. U5 ..... 5.275
S.Chicago,Ill. U5 ..... 5.275

STEEL SHEET PILING

Lackawanna,N.Y. B2 ..... 6.225
Munhall,Pa. U5 ..... 6.225
S.Chicago,Ill. U5 ..... 6.225
Weirton,W.Va. W6 ..... 6.225

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ..... 5.10
Aliquippa,Pa. J5 ..... 5.10
Ashland,Ky.(15) A10 ..... 5.10
Atlanta A11 ..... 5.30
Bessemer,Ala. T2 ..... 5.10
Clairton,Pa. U5 ..... 5.10
Claymont Del. C22 ..... 5.10
Cleveland J5, R2 ..... 5.20
Coatesville,Pa. L7 ..... 5.10
Conshohocken,Pa. A3 ..... 5.20
Ecorse,Mich. G5 ..... 5.20
Fairfield,Ala. T2 ..... 5.10
Fontana,Calif.(30) K1 ..... 5.90
Gary,Ind. U5 ..... 5.10
Geneva,Utah C11 ..... 5.10
GraniteCity,Ill. G4 ..... 5.30
Harrisburg,Pa. P4 ..... 5.10
Houston S5 ..... 5.20
Ind.Harbor,Ind. I-2, Y1 ..... 5.10
Johnstown,Pa. B2 ..... 5.10
Lackawanna,N.Y. B2 ..... 5.10
LoneStar,Tex. L6 ..... 5.20
Mansfield,O. E6 ..... 5.10
Minnequa,Colo. C10 ..... 5.95
Munhall,Pa. U5 ..... 5.10
Newport,Ky. A2 ..... 5.10
Pittsburgh J5 ..... 5.10
Riverdale,Ill. A1 ..... 5.10
Seattle B3 ..... 6.00
Sharon,Pa. S3 ..... 5.10
S.Chicago,Ill. U5, W14 ..... 5.10
SparrowsPoint,Md. B2 ..... 5.10
Sterling,Ill. N15 ..... 5.10
Steubenville,O. W10 ..... 5.10
Warren,O. R2 ..... 5.10
Youngstown U5, Y1 ..... 5.10

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 ..... 6.75
Fontana,Calif. K1 ..... 7.55
Geneva,Utah C11 ..... 6.75
Houston S5 ..... 6.85
Johnstown,Pa. B2 ..... 6.75
SparrowsPoint,Md. B2 ..... 6.75

PLATES, Wrought Iron

Economy,Pa. B14 ..... 13.15

PLATES, H.S., L.A.

Aliquippa,Pa. J5 ..... 7.625
Bessemer,Ala. T2 ..... 7.625
Clairton,Pa. U5 ..... 7.625
Claymont,Del. C22 ..... 7.625
Cleveland J5, R2 ..... 7.625
Coatesville,Pa. L7 ..... 7.925
Conshohocken,Pa. A3 ..... 7.625
Economy,Pa. B14 ..... 7.925
Ecorse,Mich. G5 ..... 7.725
Fairfield,Ala. T2 ..... 7.625
Farrell,Pa. S3 ..... 7.625
Fontana,Calif.(30) K1 ..... 8.425
Gary,Ind. U5 ..... 7.625
Geneva,Utah C11 ..... 7.625
Houston S5 ..... 7.725
Ind.Harbor,Ind. I-2, Y1 ..... 7.625
Johnstown,Pa. B2 ..... 7.625
Munhall,Pa. U5 ..... 7.625
Pittsburgh J5 ..... 7.625
Seattle B3 ..... 8.525
Sharon,Pa. S3 ..... 7.625
S.Chicago,Ill. U5, W14 ..... 7.625
SparrowsPoint,Md. B2 ..... 7.625
Warren,O. R2 ..... 7.625
Youngstown U5 ..... 7.625

PLATES, ALLOY

Aliquippa,Pa. J5 ..... 7.20
Claymont,Del. C22 ..... 7.20
Coatesville,Pa. L7 ..... 7.20
Economy,Pa. B14 ..... 7.20
Fontana,Calif. K1 ..... 8.00
Gary,Ind. U5 ..... 7.20
Houston S5 ..... 7.30
Ind.Harbor,Ind. Y1 ..... 7.20
Johnstown,Pa. B2 ..... 7.20
Lowellville,O. S3 ..... 7.20
Munhall,Pa. U5 ..... 7.20
Newport,Ky. A2 ..... 7.20
Pittsburgh J5 ..... 7.20
Seattle B3 ..... 8.10
Sharon,Pa. S3 ..... 7.20
S.Chicago,Ill. U5, W14 ..... 7.20
SparrowsPoint,Md. B2 ..... 7.20
Youngstown Y1 ..... 7.20

FLOOR PLATES

Cleveland J5 ..... 6.175
Conshohocken,Pa. A3 ..... 6.175
Ind.Harbor,Ind. I-2 ..... 6.175
Munhall,Pa. U5 ..... 6.175
S.Chicago,Ill. U5 ..... 6.175

PLATES, Ingot Iron

Ashland c.l.(15) A10 ..... 5.35
Ashland l.c.l.(15) A10 ..... 5.85
Cleveland c.l. R2 ..... 5.85
Warren,O. c.l. R2 ..... 5.85

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ..... 5.425
Aliquippa,Pa.(9) J5 ..... 5.425
Alton,Ill. L1 ..... 5.625
Atlanta(9) A11 ..... 5.625
Bessemer,Ala.(9) T2 ..... 5.425
Birmingham(9) C15 ..... 5.425
Buffalo(9) R2 ..... 5.425
Clairton,Pa.(9) U5 ..... 5.425
Cleveland(9) R2 ..... 5.425
Ecorse,Mich.(9) G5 ..... 5.525
Emeryville,Calif. J7 ..... 6.175
Fairfield,Ala.(9) T2 ..... 5.425
Fairless,Pa.(9) U5 ..... 5.575
Fontana,Calif.(9) K1 ..... 6.125
Houston(9) S5 ..... 5.675
Ind.Harbor(9) I-2, Y1 ..... 5.425
Johnstown,Pa.(9) B2 ..... 5.425
Joliet,Ill. P22 ..... 5.425
KansasCity,Mo.(9) S5 ..... 5.675
Lackawanna(9) B2 ..... 5.425
LosAngeles(9) B3 ..... 6.125
Midland,Pa.(23) C18 ..... 5.725
Milton,Pa. M18 ..... 5.575
Minnequa,Colo. C10 ..... 5.875
Niles,Calif. P1 ..... 6.125
N.Tonawanda,N.Y.(23) B11 ..... 5.775
Owensboro,Ky.(9) G8 ..... 5.425
Pittsburg,Calif.(9) C11 ..... 6.125
Pittsburgh(9) J5 ..... 5.425
Portland,Oreg. O4 ..... 6.175
Seattle B3, N14 ..... 6.175
S.Ch'c'go(9)R2,U5,W14 ..... 5.425
S.Duquesne,Pa.(9) U5 ..... 5.425
S.SanFran.,Calif.(9)B3 ..... 6.175
Sterling,Ill.(1)(9) N15 ..... 5.425
Sterling,Ill.(9) N15 ..... 5.525
Struthers,O.(9) Y1 ..... 5.425
Tonawanda,N.Y. B12 ..... 5.425
Torrance,Calif.(9) C11 ..... 6.125
Youngstown(9)R2, U5 ..... 5.425

BARS, H.R. Leaded Alloy (Including leaded extra)

Warren,O. C17 ..... 7.475

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 ..... 6.475
Bethlehem,Pa. B2 ..... 6.475
Bridgeport,Conn. C32 ..... 6.55
Buffalo R2 ..... 6.475
Canton,O. R2, T7 ..... 6.475
Clairton,Pa. U5 ..... 6.475
Detroit S41 ..... 6.475
Economy,Pa. B14 ..... 6.475
Ecorse,Mich. G5 ..... 6.575
Fairless,Pa. U5 ..... 6.625
Farrell,Pa. S3 ..... 6.475
Fontana,Calif. K1 ..... 7.525
Gary,Ind. U5 ..... 6.475
Houston S5 ..... 6.725
Ind.Harbor,Ind. I-2, Y1 ..... 6.475
Johnstown,Pa. B2 ..... 6.475
KansasCity,Mo. S5 ..... 6.725
Lackawanna,N.Y. B2 ..... 6.475
Lowellville,O. S3 ..... 6.475
LosAngeles B3 ..... 7.525
Massillon,O. R2 ..... 6.475
Midland,Pa. C18 ..... 6.475
Owensboro,Ky. G8 ..... 6.475
Pittsburgh J5 ..... 6.475
Sharon,Pa. S3 ..... 6.475
S.Chicago R2, U5, W14 ..... 6.475
S.Duquesne,Pa. U5 ..... 6.475
Struthers,O. Y1 ..... 6.475
Warren,O. C17 ..... 6.475
Youngstown U5 ..... 6.475

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 ..... 7.925
Bessemer,Ala. T2 ..... 7.925
Bethlehem,Pa. B2 ..... 7.925
Clairton,Pa. U5 ..... 7.925
Cleveland R2 ..... 7.925
Ecorse,Mich. G5 ..... 8.025
Fairfield,Ala. T2 ..... 7.925
Fontana,Calif. K1 ..... 8.625
Gary,Ind. U5 ..... 7.925
Houston S5 ..... 8.175
Ind.Harbor,Ind. Y1 ..... 7.925
Johnstown,Pa. B2 ..... 7.925
KansasCity,Mo. S5 ..... 8.175
Lackawanna,N.Y. B2 ..... 7.925
LosAngeles B3 ..... 8.625
Pittsburgh J5 ..... 7.925
Seattle B3 ..... 8.675
S.Chicago,Ill. U5, W14 ..... 7.925
S.Duquesne,Pa. U5 ..... 7.925
S.SanFrancisco B3 ..... 8.675
Struthers,O. Y1 ..... 7.925
Youngstown U5 ..... 7.925

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..... 5.575
Houston(9) S5 ..... 5.675
KansasCity,Mo.(9) S5 ..... 5.675
Lackawanna(9) B2 ..... 5.425
Sterling,Ill. N15 ..... 5.525
Sterling,Ill.(1) N15 ..... 5.425
Tonawanda,N.Y. B12 ..... 5.425

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 ..... 5.425
Atlanta A11 ..... 5.625
Joliet,Ill. P22 ..... 5.425
Niles,Calif. P1 ..... 6.125
Pittsburgh J5 ..... 5.425
Portland,Oreg. O4 ..... 6.175
SanFrancisco S7 ..... 6.275
Seattle B3 ..... 6.175

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 ..... 6.55
Clairton,Pa. U5 ..... 6.55
Gary,Ind. U5 ..... 6.55
Houston S5 ..... 6.80
KansasCity,Mo. S5 ..... 6.80
Pittsburgh J5 ..... 6.55
Youngstown U5 ..... 6.55

BARS, C.F., Leaded Alloy (Including leaded extra)

Ambridge,Pa. W18 ..... 9.925
BeaverFalls,Pa. M12 ..... 9.925
Camden,N.J. P13 ..... 10.10
Chicago W18 ..... 9.925
Cleveland C20 ..... 9.925*
Elyria,O. W8 ..... 9.925
LosAngeles P2, S30 ..... 11.40*
Monaca,Pa. S17 ..... 9.925
Newark,N.J. W18 ..... 10.10
SpringCity,Pa. K3 ..... 10.10
Warren,O. C17 ..... 9.925

*Grade A; add 0.50c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ..... 7.30
BeaverFalls,Pa. M12,R2 ..... 7.30
Birmingham C15 ..... 7.90
Buffalo B5 ..... 7.35
Camden,N.J. P13 ..... 7.75
Carnegie,Pa. C12 ..... 7.30
Chicago W18 ..... 7.30
Cleveland A7, C20 ..... 7.30
Detroit B5, P17 ..... 7.50
Detroit S41 ..... 7.30
Donora,Pa. A7 ..... 7.30
Elyria,O. W8 ..... 7.30
FranklinPark,Ill. N5 ..... 7.30
Gary,Ind. R2 ..... 7.30
GreenBay,Wis. F7 ..... 7.30
Hammond,Ind. J5, L2 ..... 7.30
Hartford,Conn. R2 ..... 7.80
Harvey,Ill. B5 ..... 7.30
LosAngeles(49) S30 ..... 8.75
LosAngeles P2, R2 ..... 8.75
Mansfield,Mass. B5 ..... 7.85
Massillon,O. R2, R8 ..... 7.30
Midland,Pa. C18 ..... 7.30
Monaca,Pa. S17 ..... 7.30
Newark,N.J. W18 ..... 7.75
NewCastle,Pa.(17) B4 ..... 7.30
Pittsburgh J5 ..... 7.30
Plymouth,Mich. P5 ..... 7.55
Putnam,Conn. W18 ..... 7.85
Readville,Mass. C14 ..... 7.85
S.Chicago,Ill. W14 ..... 7.30
SpringCity,Pa. K3 ..... 7.75
Struthers,O. Y1 ..... 7.30
Warren,O. C17 ..... 7.30
Willimantic,Conn. J5 ..... 7.80
Waukegan,Ill. A7 ..... 7.30
Youngstown F3, Y1 ..... 7.30

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19 ..... 6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ..... 8.775
BeaverFalls,Pa. M12,R2 ..... 8.775
Bethlehem,Pa. B2 ..... 8.775
Bridgeport,Conn. C32 ..... 8.925
Buffalo B5 ..... 8.775
Camden,N.J. P13 ..... 8.95
Johnstown,Pa. B2 ..... 8.775
KansasCity,Mo. S5 ..... 8.775
Carnegie,Pa. C12 ..... 8.775
Chicago W18 ..... 8.775
Cleveland A7, C20 ..... 8.775
Detroit B5, P17 ..... 8.975
Detroit S41 ..... 8.775
Donora,Pa. A7 ..... 8.775
Elyria,O. W8 ..... 8.775
FranklinPark,Ill. N5 ..... 8.775
Gary,Ind. R2 ..... 8.775
GreenBay,Wis. F7 ..... 8.775
Hammond,Ind. J5, L2 ..... 8.775
Hartford,Conn. R2 ..... 9.075
Harvey,Ill. B5 ..... 8.775
Lackawanna,N.Y. B2 ..... 8.775
LosAngeles P2, S30 ..... 10.75
Mansfield,Mass. B5 ..... 9.075
Massillon,O. R2, R8 ..... 8.775
Midland,Pa. C18 ..... 8.775
Monaca,Pa. S17 ..... 8.775
Newark,N.J. W18 ..... 8.95
Plymouth,Mich. P5 ..... 8.975
S.Chicago,Ill. W14 ..... 8.775
SpringCity,Pa. K3 ..... 8.95
Struthers,O. Y1 ..... 8.775
Warren,O. C17 ..... 8.775
Waukegan,Ill. A7 ..... 8.775
Willimantic,Conn. J5 ..... 9.075
Worcester,Mass. A7 ..... 9.075
Youngstown F3, Y1 ..... 8.775

BARS, Reinforcing (To Fabricators)

AlabamaCity,Ala. R2 5.425
Atlanta A11 5.425
Birmingham C15 5.425
Buffalo R2 5.425
Cleveland R2 5.425
Ecorse,Mich. G5 5.775
Emeryville,Calif. J7 6.175
Fairfield,Ala. T2 5.425
Fairless,Pa. U5 5.575
Fontana,Calif. K1 6.125
Ft.Worth,Tex.(4)(26)T4 5.875
Gary,Ind. U5 5.425
Houston S5 5.675
Ind.Harbor,Ind. I-2, Y1 5.425
Johnstown,Pa. B2 5.425
Joliet,Ill. P22 5.425
KansasCity,Mo. S5 5.675
Kokomo,Ind. C16 5.525
Lackawanna,N.Y. B2 5.425
LosAngeles B3 6.125
Milton,Pa. M18 5.575
Minnequa,Colo. C10 5.875
Niles,Calif. P1 6.125
Pittsburg,Calif. C11 6.125
Pittsburgh J5 5.425
Portland,Oreg. O4 6.175
SandSprings,Okla. S5 5.925
Seattle B3, N14 6.175
S.Chicago,Ill. R2 5.425
S.Duquesne,Pa. U5 5.425
S.SanFrancisco B3 6.175
SparrowsPoint,Md. B2 5.425
Sterling,Ill.(1) N15 5.425
Sterling,Ill. N15 5.525
Struthers,O. Y1 5.425
Tonawanda,N.Y. B12 6.00
Torrance,Calif. C11 6.125
Youngstown R2, U5 5.425

BARS, Reinforcing (Fabricated; to Consumers)

Boston B2, U8 7.65
Chicago U8 6.91
Cleveland U8 6.89
Houston S5 7.55
Johnstown,Pa. B2 7.08
KansasCity,Mo. S5 7.35
Lackawanna,N.Y. B2 6.85
Marion,O. P11 6.70
Newark,N.J. U8 7.55
Philadelphia U8 7.38
Pittsburgh J5, U8 7.10
SandSprings,Okla. S5 7.60
Seattle B3, N14 7.70
SparrowsPt.,Md. B2 7.08
St.Paul U8 7.92
Williamsport,Pa. S19 7.00

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 14.45
Economy,Pa.(D.R.)B14 18.00
Economy,(Staybolt)B14 18.45

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2 5.325
ChicagoHts.(4)(44) I-2 5.425
ChicagoHts.(4) C2 5.425
Franklin,Pa.(3) F5 5.325
Franklin,Pa.(4) F5 5.425
JerseyShore,Pa.(3) J8 5.30
Marion,O.(3) P11 5.325
Tonawanda(3) B12 5.325
Tonawanda(4) B12 6.00
Williamsport,Pa.(3) S19 5.50

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 4.925
Allenport,Pa. P7 4.925
Ashland,Ky.(8) A10 4.925
Cleveland J5, R2 4.925
Conshohocken,Pa. A3 4.975
Detroit(8) M1 5.025
Ecorse,Mich. G5 5.025
Fairfield,Ala. T2 4.925
Fairless,Pa. U5 4.975
Fontana,Calif. K1 5.675
Gary,Ind. U5 4.925
Geneva,Utah C11 5.025
GraniteCity,Ill.(8) G4 5.125
Ind.Harbor,Ind. I-2, Y1 4.925
Irvin,Pa. U5 4.925
Lackawanna,N.Y. B2 4.925
Mansfield,O. E6 4.925
Munhall,Pa. U5 4.925
Newport,Ky.(8) A2 4.925
Niles,O. M21, S3 4.925
Pittsburg,Calif. C11 5.625
Pittsburgh J5 4.925
Portsmouth,O. P12 4.925
Riverdale,Ill. A1 4.925
Sharon,Pa. S3 4.925
S.Chicago,Ill. W14 4.925
SparrowsPoint,Md. B2 4.925
Steubenville,O. W10 4.925
Warren,O. R2 4.925
Weirton,W.Va. W6 4.925
Youngstown U5, Y1 4.925

SHEETS, H.R.(19) Ga. & Lighter

Niles,O. M21 6.05

SHEETS, H.R. Alloy

Gary,Ind. U5 8.10
Ind.Harbor,Ind. Y1 8.10
Irvin,Pa. U5 8.10
Munhall,Pa. U5 8.10
Newport,Ky. A2 8.10
Youngstown U5, Y1 8.10

SHEETS, H.R.(14 Ga. & Heavier) High-Strength, Low-Alloy

Cleveland J5, R2 7.275
Conshohocken,Pa. A3 7.325
Ecorse,Mich. G5 7.375
Fairfield,Ala. T2 7.275
Fairless,Pa. U5 7.325
Farrell,Pa. S3 7.275
Fontana,Calif. K1 8.025
Gary,Ind. U5 7.275
Ind.Harbor,Ind. I-2, Y1 7.275
Irvin,Pa. U5 7.275
Lackawanna (35) B2 7.275
Munhall,Pa. U5 7.275
Pittsburgh J5 7.275
S.Chicago,Ill. U5, W14 7.275
Sharon,Pa. S3 7.275
SparrowsPoint(36) B2 7.275
Warren,O. R2 7.275
Weirton,W.Va. W6 7.275
Youngstown U5, Y1 7.275

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 5.175
Cleveland R2 5.675
Warren,O. R2 5.675

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 6.80
Middletown,O. A10 6.55
Warren,O. R2 6.80

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 6.05
Allenport,Pa. P7 6.05
Cleveland J5, R2 6.05
Conshohocken,Pa. A3 †6.10
Detroit M1 6.05
Ecorse,Mich. G5 6.15
Fairfield,Ala. T2 6.05
Fairless,Pa. U5 6.10
Follansbee,W.Va. F4 6.05
Fontana,Calif. K1 7.30
Gary,Ind. U5 6.05
GraniteCity,Ill. G4 6.25
Ind.Harbor,Ind. I-2, Y1 6.05
Irvin,Pa. U5 6.05
Lackawanna,N.Y. B2 6.05
Mansfield,O. E6 6.05
Middletown,O. A10 6.05
Newport,Ky. A2 6.05
Pittsburg,Calif. C11 7.00
Pittsburgh J5 6.05
Portsmouth,O. P12 6.05
SparrowsPoint,Md. B2 6.05
Steubenville,O. W10 6.05
Warren,O. R2 6.05
Weirton,W.Va. W6 6.05
Yorkville,O. W10 6.05
Youngstown Y1 6.05

SHEETS, Cold-Rolled, High-Strength, Low Alloy

Cleveland J5, R2 8.975
Ecorse,Mich. G5 9.075
Fairless,Pa. U5 9.025
Fontana,Calif. K1 10.275
Gary,Ind. U5 8.975
IndianaHarbor,Ind. Y1 8.975
Irvin,Pa. U5 8.975
Lackawanna(37) B2 8.975
Pittsburgh J5 8.975
SparrowsPoint (38) B2 8.975
Warren,O. R2 8.975
Weirton,W.Va. W6 8.975
Youngstown Y1 8.975

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	6.95	7.20
Canton,O. R2	6.95	7.45
Fairfield T2	6.95	7.20
Gary,Ind. U5	6.95	7.20
GraniteCity,Ill. G4	7.15	...
Ind.Harbor I-2	6.95	7.20
Irvin,Pa. U5	6.95	7.20
Kokomo,Ind. C16	7.05	...
MartinsFry. W10	6.95	7.20
†Pitts.,Calif. C11	7.70	...
Pittsburgh J5	6.95	...
SparrowsPt. B2	6.95	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 7.20

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2 6.60‡
Ashland,Ky. A10 6.60‡
Canton,O. R2 6.60‡
Dover,O. E6 6.60‡
Fairfield,Ala. T2 6.60‡
Gary,Ind. U5 6.60‡
GraniteCity,Ill. G4 6.80*
Ind.Harbor,Ind. I-2 6.60‡
Irvin,Pa. U5 6.60‡
Kokomo,Ind. C16 6.70‡
MartinsFerry,O. W10 6.60*
Middletown,O. A10 6.60‡
Pittsburg,Calif. C11 7.35*
Pittsburgh J5 6.60‡
SparrowsPt.,Md. B2 6.60‡
Warren,O. R2 6.60‡
Weirton,W.Va. W6 6.60*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 7.175

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 9.725
SparrowsPt.(39) B2 9.725

SHEETS, Galvannealed Steel

Canton,O. R2 7.00
Irvin,Pa. U5 7.00

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 6.85
Middletown,O. A10 6.85

SHEETS, Electrogalvanized

Cleveland (28) R2 7.425
Niles,O. (28) R2 7.425
Youngstown J5 7.275
Weirton,W.Va. W6 7.275

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.25
Butler,Pa. A10 (type 2) 9.35

SHEETS, Enameling Iron

Ashland,Ky. A10 6.625
Cleveland R2 6.625
Fairfield,Ala. T2 6.625
Gary,Ind. U5 6.625
GraniteCity,Ill. G4 6.825
Ind.Harbor,Ind. I-2, Y1 6.625
Irvin,Pa. U5 6.625
Middletown,O. A10 6.625
Niles,O. M21, S3 6.625
Youngstown Y1 6.625

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 8.65
Ind.Harbor,Ind. I-2 8.475
Yorkville,O. W10 8.475

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.00
Gary,Ind. U5 7.00
Mansfield,O. E6 7.00
Middletown,O. A10 7.00
Niles,O. M21, R2, S3 7.00
Weirton,W.Va. W6 7.00

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 7.40

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div. Buffalo Eclipse Corp.
B12 Buffalo Steel Corp
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D3 Dearborn Div., Sharon Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas & Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Special Wire
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co., Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div. Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless Steel Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U1 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.925
Allenport,Pa. P7	4.925
Alton,Ill. L1	5.125
Ashland,Ky.(8) A10	4.925
Atlanta A11	4.925
Bessemer,Ala. T2	4.925
Birmingham C15	4.925
Buffalo(27) R2	4.925
Conshohocken,Pa. A3	4.975
Detroit M1	5.025
Ecorse,Mich. G5	5.025
Fairfield,Ala. T2	4.925
Fontana,Calif. K1	5.675
Gary,Ind. U5	4.925
Ind.Harbor,Ind. I-2, Y1	4.925
Johnstown,Pa.(25) B2	4.925
Lackaw'na,N.Y.(25) B2	4.925
LosAngeles(25) B3	5.675
Minnequa,Colo. C10	6.025
Riverdale,Ill. A1	4.925
SanFrancisco S7	6.35
Seattle(25) B3	5.925
Seattle N14	6.35
Sharon,Pa. S3	4.925
S.Chicago W14	4.925
S.SanFrancisco(25) B3	5.675
SparrowsPoint,Md. B2	4.925
Sterling,Ill.(1) N15	4.925
Sterling,Ill. N15	5.025
Torrance,Calif. C11	5.675
Warren,O. R2	4.925
Weirton,W.Va. W6	4.925
Youngstown U5	4.925

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.10
Farrell,Pa. S3	8.10
Gary,Ind. T5	8.10
Houston S5	8.35
Ind.Harbor,Ind. Y1	8.10
KansasCity,Mo. S5	8.35
LosAngeles B3	9.50
Lowellville,O. S3	8.10
Newport,Ky. A2	8.10
Sharon,Pa. A2, S3	8.10
S.Chicago,Ill. W14	8.10
Youngstown U5, Y1	8.10

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2	7.325
Conshohocken,Pa. A3	7.325
Ecorse,Mich. G5	7.425
Fairfield,Ala. T2	7.325
Farrell,Pa. S3	7.325
Gary,Ind. U5	7.325
Ind.Harbor,Ind. I-2, Y1	7.325
Lackawanna,N.Y. B2	7.325
LosAngeles(25) B3	8.075
Seattle(25) B3	8.325
Sharon,Pa. S3	7.325
S.Chicago,Ill. W14	7.325
S.SanFrancisco(25) B3	8.075
SparrowsPoint,Md. B2	7.325
Warren,O. R2	7.325
Weirton,W.Va. W6	7.325
Youngstown U5, Y1	7.325

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.175
Warren,O. R2	5.675

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.15
Baltimore T6	7.15
Boston T6	7.70
Buffalo S40	7.15
Cleveland A7, J5	7.15
Conshohocken,Pa. A3	7.20
Dearborn,Mich. D3	7.25
Detroit D2, M1, P20	7.25
Dover,O. G6	7.15
Ecorse,Mich. G5	7.25
Evanston,Ill. M22	7.25
Follansbee,W.Va. F4	7.15
Fontana,Calif. K1	9.00
FranklinPark,Ill. T6	7.25
Ind.Harbor,Ind. Y1	7.15
Indianapolis J5	7.30
LosAngeles J5	9.05
LosAngeles C1	9.20
NewBedford,Mass. R10	7.60
NewBritain(10) S15	7.15
NewCastle,Pa. B4, E5	7.15
NewHaven,Conn. D2	7.60
NewKensington,Pa. A6	7.15
Pawtucket,R.I. R3	7.80
Pawtucket,R.I. N8	7.70
Philadelphia P24	7.70
Pittsburgh J5	7.15
Riverdale,Ill. A1	7.25
Rome,N.Y.(32) R6	7.15
Sharon,Pa. S3	7.15
Trenton,N.J.(31) R5	8.60
Wallingford,Conn. W2	7.60
Warren,O. R2, T5	7.15
Weirton,W.Va. W6	7.15
Worcester,Mass. A7	7.70
Youngstown J5, Y1	7.15

STRIP, Cold-Rolled Alloy

Boston T6	15.40
Carnegie,Pa. S18	15.05
Cleveland A7	15.05
Dover,O. G6	15.05
Farrell,Pa. S3	15.05
FranklinPark,Ill. T6	15.05
Harrison,N.J. C18	15.05
Indianapolis J5	15.20
Lowellville,O. S3	15.05
Pawtucket,R.I. N8	15.40
Riverdale,Ill. A1	15.05
Sharon,Pa. S3	15.05
Worcester,Mass. A7	15.35
Youngstown J5	15.05

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.45
Dearborn,Mich. D3	10.60
Dover,O. G6	10.45
Ecorse,Mich. G5	10.60
Farrell,Pa. S3	10.50
Ind.Harbor,Ind. Y1	10.65
Sharon,Pa. S3	10.50
Warren,O. R2	10.45

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	...	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. D3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	15.60	....
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis J5	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles J5	11.15	12.60	14.80	....	....
NewBritain,Conn.(10) S15	8.95	10.40	12.60	15.60	18.55
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	...	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y.(32) R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	...	10.70	12.90	16.10	19.30
Wallingford,Conn. W2	...	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown J5	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.10	21.95	26.30
Buffalo W12	18.10	....	....
Fostoria,O. S1	18.30	22.15	....
FranklinPark,Ill. T6	18.45	22.30	26.65
Harrison,N.J. C18	18.10	21.95	26.30
New York W3	18.10	21.95	26.30
Palmer,Mass. W12	18.10	....	....
Trenton,N.J. R5	18.10	21.95	26.30
Worcester,Mass. A7, T6	18.10	21.95	26.30
Youngstown J5	18.45	22.30	26.65

SILICON STEEL

H.R. SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	....	11.80	12.90	13.95
Mansfield,O. E6	9.625	11.10	11.80	12.90	13.95
Newport,Ky. A2	9.625	11.10	11.80	12.90	13.95
Niles,O. M21, S3	9.625	11.10	11.80	12.90	....
Vandergrift,Pa. U5	....	11.10	11.80	12.90	13.95
Warren,O. R2	9.625	11.10	11.80	12.90	....
Zanesville,O. A10	....	11.10	11.80	12.90	13.95

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.35	12.05	13.15	14.20
Brackenridge,Pa. A4	....	....	12.05	13.15	14.20
GraniteCity,Ill. G4	9.825*	11.05*	11.75*	12.85*	....
IndianaHarbor,Ind. I-2	9.625†	10.85*	11.55*	12.65*	....
Mansfield,O. E6	9.625*	11.35	12.05	13.15	14.20
Vandergrift,Pa. U5	9.625*	11.35	12.05	13.15	14.20
Warren,O. R2	9.625*	11.35	12.05	13.15	14.20
Zanesville,O. A10	....	11.35†	12.05	13.15	14.20
					Stator
Vandergrift,Pa. U5	....	....	....	....	7.85

H.R. SHEETS (22 Ga., cut lengths)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.00	15.55	16.05	17.10
Vandergrift,Pa. U5	15.00	15.55	16.05	17.10
Zanesville,O. A10	15.00	15.55	16.05	17.10

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	17.60	19.20	19.70	20.20	15.25††
Butler,Pa. A10	....	....	19.20	19.70	20.20	....
Vandergrift,Pa. U5	16.60	17.60	19.20	19.70	20.20	15.25**
Warren,O. R2	....	....	....	....	....	15.25‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower. ††Coils only.

Weirton,W.Va. W6 ....10.50
Youngstown Y1 ....10.65

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 ....7.90

STRIP, C.R. Electrogalvanized

Cleveland A7	7.15*
Dover,O. G6	7.15*
Evanston,Ill. M22	7.25*
Riverdale,Ill. A1	7.25*
Warren,O. B9, T5	7.15*
Worcester,Mass. A7	7.70*
Youngstown J5	7.15*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3 ....7.275

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Riverdale,Ill. A1	5.50
Sharon,Pa. S3	5.35
Youngstown U5	5.35

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.75	$9.00	$9.40
Fairfield,Ala. T2	8.85	9.10	9.50
Fairless,Pa. U5	8.85	9.10	9.50
Fontana,Calif. K1	9.50	9.75	10.15
Gary,Ind. U5	8.75	9.00	9.40
GraniteCity,Ill. G4	8.85	9.10	9.50
IndianaHarbor,Ind. I-2, Y1	8.75	9.00	9.40
Irvin,Pa. U5	8.75	9.00	9.40
Niles,O. R2	8.75	9.00	9.40
Pittsburg,Calif. C11	9.50	9.75	10.15
SparrowsPoint,Md. B2	8.85	9.10	9.50
Weirton,W.Va. W6	8.75	9.00	9.40
Yorkville,O. W10	8.75	9.00	9.40

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	7.725	7.925	....
Niles,O. R2	7.725	7.925	8.125

TIN PLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.05	$10.30
Fairfield,Ala. T2	10.15	10.40
Fairless,Pa. U5	10.15	10.40
Fontana,Calif. K1	10.80	11.05
Gary,Ind. U5	10.05	10.30
Ind.Harb. Y1	10.05	10.30
Pitts.,Calif. C11	10.80	11.05
Sp.Pt.,Md. B2	10.15	10.40
Weirton,W.Va. W6	10.05	10.30
Yorkville,O. W10	10.05	10.30

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$7.85
Fairfield,Ala. T2	7.95
Fairless,Pa. U5	7.95
Fontana,Calif. K1	8.60
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. I-2, Y1	7.85
Irvin,Pa. U5	7.85
Niles,O. R2	7.85
Pittsburg,Calif. C11	8.60
SparrowsPoint,Md. B2	7.95
Weirton,W.Va. W6	7.85
Yorkville,O. W10	7.85

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	$7.50
Gary,Ind. U5	7.50
GraniteCity,Ill. G4	7.60
Ind.Harbor,Ind. Y1	7.50
Irvin,Pa. U5	7.50
Yorkville,O. W10	7.50

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5	$9.70
Irvin,Pa. U5	9.70

ROOFING SHORT TERNES (8 lb Coated, Base Box)

Gary,Ind. U5	$11.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	7.65
Aliquippa,Pa. J5	7.65
Alton,Ill. L1	7.85
Atlanta A11	7.65
Bartonville,Ill. K4	7.75
Buffalo W12	7.65
Chicago W13	7.65
Cleveland A7, C20	7.65
Crawfordsville,Ind. M8	7.75
Donora,Pa. A7	7.65
Duluth A7	7.65
Fairfield,Ala. T2	7.65
Fostoria,O.(24) S1	7.75
Houston S5	7.90
Jacksonville,Fla. M8	8.00
Johnstown,Pa. B2	7.65
Joliet,Ill. A7	7.65
KansasCity,Mo. S5	7.90
Kokomo,Ind. C16	7.75
LosAngeles B3	8.60
Minnequa,Colo. C10	7.90
Monessen,Pa. P7, P16	7.65
N.Tonawanda,N.Y. B11	7.65
Palmer,Mass. W12	7.95
Pittsburg,Calif. C11	8.60
Portsmouth,O. P12	7.65
Rankin,Pa. A7	7.65
S.Chicago,Ill. R2	7.65
S.SanFrancisco C10	8.60
SparrowsPoint,Md. B2	7.75
Sterling,Ill.(1) N15	7.65
Sterling,Ill. N15	7.75
Struthers,O. Y1	7.65
Waukegan,Ill. A7	7.65
Worcester,Mass. A7	7.95

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	12.65
Buffalo W12	12.65
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	12.65
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	12.85
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	12.95
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md. B2	12.75
Struthers,O. Y1	12.65
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.30
Alton,Ill. L1	9.50
Buffalo W12	9.30
Cleveland A7	9.30
Donora,Pa. A7	9.30
Duluth A7	9.30
Johnstown,Pa. B2	9.30
KansasCity,Mo. S5	9.55
LosAngeles B3	10.25
Minnequa,Colo. C10	9.50
Monessen,Pa. P7, P16	9.30
NewHaven,Conn. A7	9.60
Palmer,Mass. W12	9.60
Pittsburg,Calif. C11	10.25
Portsmouth,O. P12	9.30
Roebling,N.J. R5	9.60
S.Chicago,Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt.,Md. B2	9.40
Struthers,O. Y1	9.30
Trenton,N.J. A7	9.60
Waukegan,Ill. A7	9.30
Worcester,Mass. A7, T6	9.60

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.30
Alton,Ill. L1	9.50
Bartonville,Ill. K4	9.40
Buffalo W12	9.30
Cleveland A7	9.30
Donora,Pa. A7	9.30
Duluth A7	9.30
Fostoria,O. S1	9.35
Johnstown,Pa. B2	9.30
KansasCity,Mo. S5	9.55
LosAngeles B3	10.25
Milbury,Mass.(12) N6	9.60
Minnequa,Colo. C10	9.50
Monessen,Pa. P7, P16	9.30
Muncie,Ind. I-7	9.50
Palmer,Mass.(12) W12	9.60
Pittsburg,Calif. C11	10.25
Portsmouth,O. P12	9.30
Roebling,N.J. R5	9.60
S.Chicago,Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt.,Md. B2	9.40
Struthers,O. Y1	9.30
Trenton,N.J. A7	9.60
Waukegan,Ill. A7	9.30
Worcester A7, J4, T6	9.60

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	15.80
Bartonville,Ill. K4	15.70
Buffalo W12	15.60
Chicago W13	15.60
Cleveland A7	15.60
Crawfordsville,Ind. M8	15.70
Fostoria,O. S1	15.60
Houston S5	15.85
Jacksonville,Fla. M8	15.95
Johnstown,Pa. B2	15.60
KansasCity,Mo. S5	15.85
Kokomo,Ind. C16	15.60
Minnequa,Colo. C10	15.85
Monessen,Pa. P16	15.60
Muncie,Ind. I-7	15.80
Palmer,Mass. W12	15.90
S.SanFrancisco C10	16.45
Waukegan,Ill. A7	15.60
Worcester,Mass. A7, T6	15.90

ROPE WIRE (A)

Bartonville,Ill. K4	12.75
Buffalo W12	12.75
Fostoria,O. S1	12.75
Johnstown,Pa. B2	12.75
Monessen,Pa. P7	12.75
Muncie,Ind. I-7	12.95
Palmer,Mass. W12	13.05
Portsmouth,O. P12	12.75
Roebling,N.J. R5	13.05
SparrowsPt.,Md. B2	12.85
Struthers,O. Y1	12.75
Worcester,Mass. J4	13.05

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Tire Bead

Bartonville,Ill. K4	16.55
Monessen,Pa. P16	16.55
Roebling,N.J. R5	17.05

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	11.65
Baltimore T6	11.95
Boston T6	11.95
Buffalo W12	11.65
Chicago W13	11.75
Cleveland A7	11.65
Crawfordsville,Ind. MS	11.65
Dover,O. G6	11.65
Fostoria,O. S1	11.65
FranklinPark,Ill. T6	11.75
Kokomo,Ind. C16	11.65
Massillon,O. R8	11.65
Milwaukee C23	11.85
Monessen,Pa. P7, P16	11.65
Palmer,Mass. W12	11.95
Pawtucket,R.I. NS	11.95
Philadelphia P24	11.95
Riverdale,Ill. A1	11.75
Rome,N.Y. R6	11.65
Sharon,Pa. S3	11.65
Trenton,N.J. R5	11.95
Warren,O. B9	11.65
Worcester,Mass. A7, T6	11.95

NAILS, Stock — **Col.**

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. MS	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla.(20) MS	184
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers; per cwt)

Galveston,Tex. D7	$9.10

NAILS, Cut (100 lb keg) To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

POLISHED STAPLES — **Col.**

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	175
Atlanta A11	177
Bartonville,Ill. K4	177
Crawfordsville,Ind. MS	177
Donora,Pa. A7	175
Duluth A7	175
Fairfield,Ala. T2	175
Houston S5	180
Jacksonville,Fla.(20) MS	186
Johnstown,Pa. B2	175
Joliet,Ill. A7	175
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	180
Pittsburg,Calif. C11	194
Rankin,Pa. A7	175
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$10.26
Atlanta A11	10.36
Bartonville,Ill. K4	10.36
Buffalo W12	10.26
Chicago W13	10.26
Crawfordsville,Ind. MS	10.36
Donora,Pa. A7	10.26
Duluth A7	10.26
Fairfield,Ala. T2	10.26
Houston S5	10.51
Jacksonville,Fla. M8	10.82
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	10.26
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	10.36
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	11.04
S.Chicago,Ill. R2	10.26
S.SanFrancisco C10	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill.(37) N15	10.36

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$10.60
Atlanta A11	10.70
Bartonville,Ill. K4	10.70
Buffalo W12	10.60
Chicago W13	10.60
Crawfordsville,Ind. MS	10.70
Donora,Pa. A7	10.60
Duluth A7	10.60
Fairfield,Ala. T2	10.60
Houston S5	10.85
Jacksonville,Fla. MS	11.16
Johnstown,Pa. B2	10.60
Joliet,Ill. A7	10.60
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	10.70
Los Angeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	11.40
S.Chicago,Ill. R2	10.60
S.SanFrancisco C10	11.40
SparrowsPt.,Md. B2	10.70
Sterling,Ill.(37) N15	10.70

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$10.65
Atlanta A11	10.75
Bartonville,Ill. K4	10.75
Buffalo W12	10.65
Chicago W13	10.65
Crawfordsville,Ind. MS	10.75
Donora,Pa. A7	10.65
Duluth A7	10.65
Fairfield,Ala. T2	10.65
Houston S5	10.90
Jacksonville,Fla. MS	11.21
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	10.65
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	10.75
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	11.45
S.Chicago,Ill. R2	10.65
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill.(37) N15	10.75

BALE TIES, Single Loop — **Col.**

AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. MS	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. MS	219
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSSTS

Birmingham C15	172
ChicagoHts., Ill. C2, I-2	172
Duluth A7	172
Franklin,Pa. F5	172
Huntington,W.Va. C15	172
Johnstown,Pa. B2	172
Marion,O. P11	172
Minnequa,Colo. C10	177
Sterling,Ill.(1) N15	172
Tonawanda,N.Y. B12	174

WIRE, Barbed — **Col.**

AlabamaCity,Ala. R2	193‡
Aliquippa,Pa. J5	190‡
Atlanta A11	198*
Bartonville,Ill. K4	198
Crawfordsville,Ind. MS	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198‡
Jacksonville,Fla. MS	203
Johnstown,Pa. B2	196‡
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196‡
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213**
SparrowsPoint,Md. B2	198‡
Sterling,Ill.(7) N15	198††

WOVEN FENCE, 9-15 Ga. — **Col.**

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-14½ga.J5	190‡
Atlanta A11	192*
Bartonville,Ill. K4	192
Crawfordsville,Ind. MS	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. MS	197
Johnstown,Pa.(43) B2	190‡
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192††

	An'ld	**Galv.**
WIRE (16 gage)	**Stone**	**Stone**
Ala.City,Ala.R2	17.15	18.70**
Aliq'ppa,Pa. J5	17.15	18.95
Bartonville K4	17.25	19.05
Cleveland A7	17.15	...
Crawf'dsville MS	17.25	19.05
Fostoria,O. S1	17.65	19.20†
Houston S5	17.40	18.95**
Jacksonville MS	17.50	19.30
Johnstown B2	17.15	18.95‡
Kan.City,Mo. S5	17.40	...
Kokomo C16	17.25	18.80†
Minnequa C10	17.40	18.95**
P'lm'r,Mass.W12	17.45	19.00†
Pitts.,Calif. C11	17.50	19.05†
SparrowsPt. B2	17.25	19.05‡
Sterling(37)N15	17.25	19.05††
Waukegan A7	17.15	18.70†
Worcester A7	17.45	...

WIRE, Merchant Quality (6 to 8 gage) An'ld Galv.

Ala.City,Ala. R2	8.65	9.20**
Aliquippa J5	8.65	9.325‡
Atlanta(48) A11	8.75	9.425*
Bartonville(48) K4	8.75	9.425
Buffalo W12	8.65	9.20†
Cleveland A7	8.65	...
Crawfordsville MS	8.75	9.425
Donora,Pa. A7	8.65	9.20†
Duluth A7	8.65	9.20†
Fairfield T2	8.65	9.20†
Houston(48) S5	8.90	9.45**
Jacks'ville,Fla. MS	9.00	9.675
Johnstown B2(48)	8.65	9.325‡
Joliet,Ill. A7	8.65	9.20†
Kans.City(48) S5	8.90	9.45**
Kokomo C16	8.75	9.30†
LosAngeles B3	9.60	10.275‡
Minnequa C10	8.90	9.45**
Monessen P7(48)	8.65	9.325‡
Palmer,Mass. W12	8.95	9.50†
Pitts.,Calif. C11	9.60	10.15†
Rankin,Pa. A7	8.65	9.20†
S.Chicago R2	8.65	9.20**
S.SanFran. C10	9.60	10.15**
Spar'wsPt.B2(48)	8.75	9.425‡
Sterling(48) N15	8.90	9,575††
Sterling(1) (48)	8.80	9.475††
Struthers,O. Y1	8.65	9.30‡
Worcester,Mass.A7	8.95	9.50†

Based on zinc price of: *13.50. †5c. $10c. ‡Less than 10c. ††10.50c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts

Full Size Body (cut thread)

½ in. and smaller:	
6 in. and shorter	49.0
Longer than 6 in.	39.0
⅝ in. thru 1 in.:	
6 in. and shorter	39.0
Longer than 6 in.	35.0
1⅛ in. and larger:	
All lengths	35.0

Undersized Body (rolled thread)

½ in. and smaller:	
6 in. and shorter	49.0

Carriage, Machine, Lag Bolts

Hot Galvanized:

½ in. and smaller:	
6 in. and shorter	29.0
Longer than 6 in.	15.0
⅝ in. and larger:	
All lengths	12.0

Lag Bolts (all diam.)

6 in. and shorter	49.0
Longer than 6 in.	39.0

Plow and Tap Bolts

½ in. and smaller by 6 in. and shorter	49.0
Larger than ½ in. or longer than 6 in.	39.0

Blank Bolts 39.0

Step, Elevator, Tire Bolts 49.0

Stove Bolts, Slotted:

⅛ to ¼ in. Incl., 3 in. and shorter	55.0
5/16 to ½ in., inclusive	55.0

NUTS

Reg. & Heavy Square Nuts:

All sizes	55.5

Square Nuts, Reg. &

Heavy, Hot Galvanized:

All sizes	41.0

Hex Nuts, Reg. &

Heavy, Hot Pressed:

¾ in. and smaller	60.5
⅞ in. to 1 in., incl.	55.5
1⅛ in. to 1½ in., incl.	58.5
1⅝ in. and larger	53.5

Hex Nuts, Reg. &

Heavy, Cold Punched:

¾ in. and smaller	60.5
⅞ in. to 1½ in., incl.	55.5
1⅝ in. and larger	53.5

Hex Nuts, All Types, Hot Galvanized:

¾ in. and smaller	46.5
⅞ in. to 1 in., incl.	41.5
1⅛ in. to 1½ in., incl.	46.5

Hex Nuts, Semifinished, Heavy (Incl. Slotted):

¾ in. and smaller	60.5
⅞ in. to 1½ in., incl.	55.5
1⅝ in. and larger	53.5

Hex Nuts, Finished (Incl.) Slotted and Castellated):

1 in. and smaller	63.0
1⅛ in. to 1½ in., incl.	59.0
1⅝ in. and larger	53.5

Semifinished Hex Nuts, Reg. (Incl. Slotted):

⅝ in. and smaller	60.5
¾ in. to 1 in., incl.	63.0
1⅛ to 1½ in., incl.	59.0
1⅝ in. and larger	53.5

CAP AND SETSCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Capscrews, Coarse or Fine Thread, Bright:

6 in. and shorter:	
⅝ in. and smaller	40.0
¾, ⅞, and 1 in. diam.	22.0
Longer than 6 in.:	
⅜ in. and smaller	8.0
½, ⅝, and 1 in. diam.	+ 6.0

High Carbon, Heat Treated:

6 in. and shorter:	
⅝ in. and smaller	26.0
¾, ⅞, and 1 in. diam.	3.0
Longer than 6 in.:	
⅝ in. and smaller	+ 13.0
¾, ⅞, and 1 in. diam.	+ 32.0

Flat Head Capscrews:

¾ in. and smaller	+ 76.0

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam.:	
6 in. and shorter	Net
Longer than 6 in.	+ 23

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.25

7/8 in. under: List less 19%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	25.98	23.54
1¼	13	....	30.78	23.36
1½	13	29.03	34.01	25.83
1¾	13	34.29	40.18	30.51
2	13	38.44	45.05	34.20
2¼	13	43.29	50.75	38.52
2½	12	46.99	55.06	41.81
2¾	12	51.76	60.65	46.05
3	12	56.04	65.67	49.88
	12	59.76	70.03	53.19

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.525	5.425	....	6.50
Ensley,Ala. T2	5.525	5.425	....	6.50
Fairfield,Ala. T2	....	....	....	6.50
Gary,Ind. U5	5.525	5.425	....	....
Huntington,W.Va. C15	....	....	....	6.50
IndianaHarbor,Ind. I-2	5.525	5.425	5.475	....
Johnstown,Pa. B2	....	....	...(16)	6.50
Lackawanna,N.Y. B2	5.525	5.425	....	6.50
Minnequa,Colo. C10	5.525	5.425	....	7.00
Steelton,Pa. B2	5.525	5.425	....	....
Williamsport,Pa. S19	....	....	....	6.50

TIE PLATES

Fairfield,Ala. T2	6.60
Gary, Ind. U5	6.60
Ind.Harbor,Ind. I-2	6.60
Lackawanna,N.Y. B2	6.60
Minnequa,Colo. C10	6.60
Seattle B3	6.75
Steelton,Pa. B2	6.60
Torrance,Calif. C11	6.75

JOINT BARS

Bessemer,Pa. U5	6.975
Fairfield,Ala. T2	6.975
Ind. Harbor,Ind. I-2	6.975
Joliet,Ill. U5	6.975
Lackawanna,N.Y. B2	6.975
Minnequa,Colo. C10	6.975
Steelton,Pa. B2	6.975

AXLES

Ind.Harbor,Ind. S13	8.775
Johnstown,Pa. B2	8.775

TRACK BOLTS, Untreated

Cleveland R2	14.75
KansasCity,Mo. S5	14.75
Lebanon,Pa. B2	14.75
Minnequa,Colo. C10	14.75
Pittsburgh P14	14.75
Seattle B3	15.25

SCREW SPIKES

Lebanon,Pa. B2	14.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	9.75
Ind.Harbor,Ind. I-2, Y1	9.75
KansasCity,Mo. S5	9.75
Lebanon,Pa. B2	9.75
Minnequa,Colo. C10	9.75
Pittsburgh J5	9.75
Seattle B3	10.25
S.Chicago,Ill. R2	9.75
Struthers,O. Y1	9.75
Youngstown R2	9.75

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.15c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.60c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 9.50c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Ambridge, Pa. N2	+9.25	....	+2.75	....	+0.25	....	1.25	....	1.25	....	1	....	3.5	....
Lorain, O. N3	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Youngstown Y1	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

ELECTRIC STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Alton, Ill. L1	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Benwood, W. Va. W10	4.5	+22	+7.5	+31	+18	+39.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Butler, Pa. F6	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Fairless, Pa. N3	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Fontana, Calif. K1	....	....	....	....	....	....	+8.25	+23.5	+5.25	+19.5	+1.75	+15	0.75	+14.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	4.25	+11	7.25	+7	10.75	+2.5	13.25	+3.25
Lorain, O. N3	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sharon, Pa. S4	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sparrows Pt., Md. B2	3.5	+23	+8.5	+32	+19	+40.5	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Wheatland, Pa. W9	5.5	+21	+6	+30	+17	+38.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Youngstown R2, Y1	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	14.75	0.25	15.25	0.75	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Alton, Ill. L1	12.75	+1.75	13.25	+1.25	16.75	0.5	16.75	0.5	....	....	....	....
Benwood, W. Va. W10	14.75	0.25	15.25	0.75	14.75	+1.5	14.75	+1.5	....	....	....	....
Etna, Pa. N2	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Fairless, Pa. N3	12.75	+1.75	13.25	+1.25	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Fontana, Calif. K1	1.25	+13.25	1.75	+12.75	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Indiana Harbor, Ind. Y1	13.75	+0.75	14.25	+0.25	3.25	+13	3.25	+13	+7.25	+24	+7.25	+24
Lorain, O. N3	14.75	0.25	15.25	0.75	15.75	+0.5	15.25	+0.5	5.25	+11.5	5.25	+11.5
Sharon, Pa. M6	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sparrows Pt., Md. B2	12.75	+1.75	13.25	+1.25	16.75	0.5	16.75	0.5	....	....	....	....
Wheatland, Pa. W9	14.75	0.25	15.25	0.75	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Youngstown R2, Y1	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
					16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5

*Galvanized pipe discounts based on current price of zinc (10.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.00	27.00	....	36.00	40.00	42.00	44.25	48.50	45.00
202	23.75	30.25	36.50	39.00	40.75	43.00	45.00	49.25	49.25
301	23.25	28.00	37.25	37.25	42.00	44.25	46.25	51.25	47.25
302	25.25	31.50	38.00	40.50	42.75	45.00	47.25	52.00	52.00
302B	25.50	32.75	40.75	45.75	45.00	47.25	49.50	57.00	57.00
303	....	32.00	41.00	46.00	45.50	48.00	50.00	56.75	56.75
304	27.00	33.25	40.50	44.25	45.25	47.75	50.75	55.00	55.00
304L	....	....	48.25	51.50	53.00	55.50	58.50	63.25	62.75
305	28.50	36.75	42.50	47.50	45.25	47.75	51.25	58.75	58.75
308	30.75	38.25	47.25	50.25	52.75	55.75	60.25	63.00	63.00
309	39.75	49.50	57.75	64.50	63.75	67.00	71.00	80.50	80.50
310	49.75	61.50	78.00	84.25	86.50	91.00	92.75	96.75	96.75
314	....	....	77.50	....	86.50	91.00	92.75	99.00	104.25
316	39.75	49.50	62.25	69.25	69.25	73.00	76.75	80.75	80.75
316L	....	55.50	70.00	76.50	77.00	80.75	84.50	89.25	88.50
317	48.00	60.00	76.75	88.25	86.25	90.75	93.50	101.00	101.00
321	32.25	40.00	47.00	53.50	52.50	55.50	59.75	65.50	65.50
330	....	....	106.75	....	95.25	106.75	105.50	108.00	149.25
18-8 CbTa	37.00	46.50	55.75	63.50	61.50	64.75	69.75	79.25	79.25
403	....	....	32.00	....	35.75	37.75	40.25	48.25	48.25
405	19.50	25.50	29.75	36.00	33.50	35.25	37.50	46.75	46.75
410	16.75	21.50	28.25	31.00	32.00	33.75	35.00	40.25	40.25
416	....	....	28.75	....	32.50	34.25	36.00	48.25	48.25
420	26.00	33.50	34.25	41.75	39.25	41.25	45.25	52.00	62.00
430	17.00	21.75	28.75	32.00	32.50	34.25	36.00	40.75	40.75
430F	....	....	29.50	....	33.00	34.75	36.75	51.75	42.00
431	....	28.75	37.75	....	42.00	44.25	46.00	56.00	56.00
446	....	....	39.25	59.00	44.25	46.50	47.75	70.00	70.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless Steel Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels Inc.; U. S. Steel Corp.; Universal-Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel Co., subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	34.70	37.95	42.25	46.70	39.75
304L	36.90	40.55	45.10	49.85	....
316	40.35	44.50	49.50	54.50	59.25
316L	45.05	49.35	54.70	60.10	....
316 Cb	47.30	53.80	61.45	69.10	....
321	36.60	40.05	44.60	49.30	47.25
347	38.25	42.40	47.55	52.80	57.00
405	28.60	29.85	33.35	36.85	....
410	28.15	29.55	33.10	36.70	....
430	28.30	29.80	33.55	37.25	....
Inconel	48.00	59.55	70.15	80.85	....
Nickel	41.65	51.95	62.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.10	38.75

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.305	Cr-Hot Work	0.475
Extra Carbon	0.360	W-Cr Hot Work	0.500
Special Carbon	0.475	V-Cr Hot Work	0.520
Oil Hardening	0.0475	Hi-Carbon-Cr	0.925

Grade by Analysis (%)

W	Cr	V	Co	Mo		$ per lb
20.25	4.25	1.6	12.25	....	....	4.285
18.25	4.25	1	4.75	....	....	2.500
18	4	2	9	....	....	2.870
18	4	2	....	....	....	1.960
18	4	1	....	....	....	1.795
9	3.5	..	....	....	....	1.395
13.5	4	3	....	....	....	2.060
13.75	3.75	2	5	....	....	2.440
6.4	4.5	1.9	....	5	....	1.300
6	4	3	....	6	....	1.545
1.5	4	1	....	8.5	....	1.155

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal transportation tax.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	62.00	62.50‡	....	....
Birmingham U6	....	62.50‡	66.50	....
Woodward,Ala. W15	62.00**	62.50‡	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda,N.Y. T9	....	66.50	67.00	67.50
Tonawanda,N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester,N.Y., deld.	69.02	69.52	70.02	....
Syracuse,N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago,Ill. R2	66.00	66.50	66.50	67.00
S.Chicago,Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon,Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron,Ohio, deld.	69.12	69.62	69.62	70.12
Mid-Atlantic District				
Birdsboro,Pa. B10	68.00	68.50	69.00	69.50
Chester,Pa. P4	68.00	68.50	69.00	....
Swedeland,Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.50	76.00	....
Newark,N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy,N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
NevilleIsland,Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks,Pa., deld.	....	67.60	67.60	68.13
Lawrenceville,Homestead, Wilmerding,Monaca,Pa. deld.	....	68.26	68.26	68.79
Verona,Trafford,Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge,Pa., deld.	68.60	69.10	69.10	69.63
Midland,Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard,Ohio Y1	....	....	66.50	....
Sharpsville,Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	67.00
Mansfield,Ohio, deld.	70.90	....	71.40	71.90

	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie,Pa. I-3	66.00	66.50	66.50	67.00
Everett,Mass. E1	67.50	68.00	68.50	....
Fontana,Calif. K1	75.00	75.50	....	....
Geneva,Utah C11	66.00	66.50	....	....
GraniteCity,Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa,Colo. C10	68.00	68.50	69.00	....
Rockwood,Tenn. T3	....	62.50‡	66.50	....
Toledo,Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.54	73.04	....	....

**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
‡Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.
Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$99.00
NiagaraFalls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry. $9 freight allowed K2	103.50
Keokuk,Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2	106.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$78.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	78.50
Troy,N.Y. R2 (Phos. 0.035% max)	74.00
Philadelphia, deld.	82.67
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††§		Carbon	Floor
Atlanta	8.59‖	9.86‖	....	....	8.64	9.01	10.68	....	9.05	8.97	10.90
Baltimore	8.28	8.88	9.68	....	8.76	9.06	11.34#	15.18	9.19	8.66	10.14
Birmingham	8.18	9.45	11.07	....	8.23	8.60	10.57	....	8.64	8.56	10.70
Boston	9.38	10.44	11.45	53.50	9.42	9.73	12.90#	15.28	9.63	9.72	11.20
Buffalo	8.40	9.00	10.07	55.98	8.50	8.80	10.90#	15.00	8.90	8.90	10.45
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.20	9.45	10.10	53.00	8.23	8.60	8.80	14.65	8.64	8.56	9.88
Cincinnati	8.24	9.48	10.10	52.43	8.54	8.92	9.31	14.96	9.18	8.93	10.21
Cleveland	8.18	9.45	10.20	52.33	8.33	8.69	10.80#	14.74	9.01	8.79	10.11
Dallas	7.50	8.80	....	....	7.65	7.60	11.01	....	9.00	9.45	10.70
Denver	9.38	11.75	....	....	9.41	9.78	11.10	....	7.65	8.45	9.70
Detroit	8.43	9.70	10.45	56.50	8.58	8.90	9.15	14.91	9.18	8.91	10.13
Erie, Pa.	8.20	9.45	9.95[10]	....	8.50	8.75	9.05[10]	....	9.00	8.85	10.10
Houston	7.10	8.40	8.45	54.32	7.25	7.20	11.10	13.50	7.25	8.05	9.30
Jackson, Miss.	8.52	9.79	....	....	8.57	8.94	10.68	....	8.97	8.90	10.74
Los Angeles	9.60	9.40	11.70	57.60	8.55	8.70	12.00	....	8.60	8.55	10.70
Memphis, Tenn.	8.55	9.80	....	....	8.60	8.97	11.96#	....	9.01	8.93	10.56
Milwaukee	8.33	9.58	10.23	....	8.36	8.73	9.03	14.78	8.85	8.69	10.01
Moline, Ill.	8.55	9.80	10.45	....	8.58	8.95	9.15	....	8.99	8.91	....
New York	8.87	10.13	10.56	53.08	9.31	9.57	12.76#	15.09	9.35	9.43	10.71
Norfolk, Va.	8.40	....	....	....	9.10	9.10	12.00	....	9.40	8.85	10.35
Philadelphia	8.00	8.90	9.92	52.69	8.70	8.65	11.51#	15.01	8.50	8.75	9.75**
Pittsburgh	8.18	9.45	10.45	52.00	8.33	8.60	10.80#	14.65	8.64	8.56	9.88
Portland, Oreg.	8.50	11.20	11.55	57.38	9.55	8.65	14.50	15.95	8.65	8.30	11.50
Richmond, Va.	8.40	....	10.40	....	9.10	9.00	....	....	9.40	8.85	10.35
St. Louis	8.54	9.79	10.46	....	8.59	8.97	9.41	15.01	9.10	8.93	10.25
St. Paul	8.79	10.04	10 71	....	8.84	9.21	9.66	....	9.38	9.30	10.49
San Francisco	9.35	10.75	11.00	55.10	10.95	9.70	11.34#	16.10	9.50	9.60	12.00
Seattle	9.95	11.15	12.20	57.38	10.00	10.10	14.05	16.35	9.80	9.70	12.10
South'ton, Conn.	9.07	10.33	10 71	....	9.48	9.74	....	....	9.57	9.57	10.91
Spokane	9.95	11.15	12.00	57.38	10.00	10.10	14.05	17.20	9.80	9.70	12.10
Washington	8.88	....	....	....	9.36	9.56	10.94	....	9.79	9.26	10.74

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **⅛ in. and heavier; ††as annealed; ‡‡over 4 in.; §§over 3 in.; #1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, Portland, Oreg. 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Portland, Oreg., 1000 to 9999 lb; [3]—400 to 9999 lb; [8]—1000 to 1999 lb; [8]—2000 to 3999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, Ohio, $138; Cutler, Utah, $165.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., $150; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $140; Philadelphia, $137; Woodbridge, N. J., $135.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa. Portsmouth, Ohio. $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Philadelphia, Clearfield, Orviston, Snow Shoe, Pa., $305.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Philadelphia, Clearfield, Orviston, Snow Shoe, Pa., $345.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa. $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-41; 70%, $36.40; 60%, $33-36.50. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $33-34; Mexican, all rail, duty paid, $25.25-25.75; barge, Brownsville, Tex., $27.25-27.75.

Ores

Lake Superior Iron Ore

(Prices effective for the 1958 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	25.00-27.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	25.00
N. African hematite (spot)	nom.
Brazilian iron ore, 68-69%	27.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$11.80-12.00*
Domestic, concentrates f.o.b. milling points	20.00

*Before duty.

Manganese Ore

Mn 46-48%, Indian (export tax included), $135 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; other than Indian, nominal; contracts by negotiation.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48%	3:1	$50.00
48%	2.8:1	48.00
48%	no ratio	39.00

South African Transvaal

48%	no ratio	$37.00
44%	no ratio	27.00

Turkish

48%	3:1	$55.00

Domestic

Rail nearest seller

18%	3:1	39.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard	
55-60%	$2.50-2.60
60-65%	2.60-2.90

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, Swedish: Deld. east of Mississippi River, ocean bags 23,000 lb and over..	10.50
F.o.b. Riverton or Camden, N. J., west of Mississippi River.	9.50
Sponge Iron, Domestic, 98 + % Fe: Deld. east of Mississippi River, 23,000 lb and over	10.50
Electrolytic Iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	28.00
Annealed, 99.5% Fe..	36.50
Unannealed (99 + % Fe)	36.00
Unannealed (99 + % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)..	29.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	

Aluminum: Atomized, 500-lb drum, freight allowed Carlots	39.50
Ton lots	41.50
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	30.30-45.70†
Bronze, 5000-lb lots	45.70-49.80†
Copper: Electrolytic	14.75*
Reduced	14.75*
Lead	7.50*
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.15
Nickel-Silver, 5000-lb lots	47.80-52.60†
Phosphor-Copper, 5000-lb lots	57.80
Copper (atomized) 5000-lb lots	38.30-46.80†
Silicon	47.50
Solder	7.00*
Stainless Steel, 304	$1.07
Stainless Steel, 316	$1.26
Tin	14.50*
Zinc, 5000-lb lots	17.50-30.70†

Tungsten:	Dollars
Melting grade, 99% 60 to 200 mesh, nominal; 1000 lb and over..	3.15
Less than 1000 lb ..	3.30
Chromium, electrolytic 99.8% Cr min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$60.75
2½	30	39.25
3	40	37.00
4	40	35.00
5⅛	40	34.75
6	60	31.50
7	60	28.25
8, 9, 10	60	28.00
12	72	26.75
14	60	26.75
16	72	25.75
17	60	26.25
18	72	26.25
20	72	25.25
24	84	26.00

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.75
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$28.85
Cincinnati, deld.	31.84
Buffalo, ovens	30.50
Camden, N. J., ovens	29.50
Detroit, ovens	30.50
Pontiac, Mich., deld.	32.45
Saginaw, Mich., deld.	34.03
Erie, Pa., ovens	30.50
Everett, Mass., ovens: New England, deld.	31.55*
Indianapolis, ovens	29.75
Ironton, Ohio, ovens	29.00
Cincinnati, deld.	31.84
Kearny, N. J., ovens	29.75
Milwaukee, ovens	30.50
Neville Island (Pittsburgh), Pa., ovens	29.25
Painesville, Ohio, ovens	30.50
Cleveland, deld.	32.69
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
St. Paul, ovens	29.75
Chicago, deld.	33.29
Swedeland, Pa., ovens	29.50
Terre Haute, Ind., ovens	29.75

*Or within $4.85 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries.)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305 ..	$5.53	$5.33	$5.33	$5.73
Bar Size Angles	5.73	5.58	5.58	5.99
Structural Angles	5.73	5.58	5.58	5.99
I-Beams	5.88	5.72	5.72	6.02
Channels	5.88	5.72	5.72	6.02
Plates (basic bessemer)	6.79	6.62	6.62	6.94
Sheets, H.R.	8.25	8.20	8.20	8.50
Sheets, C.R. (drawing quality)	9.00	8.95	8.95	9.25
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.71	25.59	25.59	26.46
Barbed Wire (†)	6.65	6.65	6.65	7.00
Merchant Bars	6.23	6.07	6.07	6.43
Hot-Rolled Bands	7.20	7.15	7.15	7.55
Wire Rods, Thomas Commercial No. 5	6.73	6.73	6.73	7.13
Wire Rods, O.H. Cold Heading Quality No. 5	7.07	7.07	7.07	7.47
Bright Common Wire Nails ($)	8.02	8.02	7.92	8.20

†Per 82 lb, net, reel. $Per 100-lb kegs, 20d nails and heavier.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg	29.50
Industrial xylene	32.00-34.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00-34.00

Cents per pound, producing point

Phenol: Grade 1, 17.50; Grade 2-3, 15.50; Grade 4, 17.50; Grade 5, 16.50; Grade 6, 14.50.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton. Palmerton, Neville Island, Pa., 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton: $245, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively. (Mn 79-81%). Lump $253 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-90%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices. 3c for max 0.03% C. 3.5c for max 0.05% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2%). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 34c; 2000 lb to min carload, 36c; 500 lb to 1999 lb, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2% from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38.43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk 28.75c per lb of contained Cr; c.l. packed 30.30c, ton lot 32.05c; less ton 33.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Ton lot, add 3.5c; less ton, add 5.2c. Delivered.
Cr 67-71%, carload, lump, bulk, C 0.02% max, 41.00c per lb contained Cr; 0.025 max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Ton lot, add 3.4c; less ton lot, add 5.1c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 61-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 30.05c per lb of contained Cr. Packed, c.l. 31.65c, ton 33.45c, less ton 34.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, SM x D, 21.25c per lb of alloy, ton lot 22.50c; less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk, 3" x down and 2" down, 27.50c per lb contained Cr, 14.20c per lb contained Si. 0.75" x down, 28.65c per lb contained Cr, 14.20c per lb contained Si. Delivered.

Chromium Metal Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40. **Grainal:** Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 14.20c per lb of contained Si. Packed c.l. 16.70c, ton lot 18.15c, less ton 19.80c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.
65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed, c.l. 17.25c, ton lot 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c, per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 22.00c per lb of Si. Packed, c.l. 23.65c, ton lot 24.95c, less ton 25.95c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c, for max 1% Fe grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy; ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contact, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.
35-40% Zirconium Alloy: Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carload 9.50c per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALICIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Contract, carload, bulk 19.60c per lb of briquet, carload packed in box pallets 19.80c, in bags 20.70c; 3000 lb to c.l. in box pallets 21.00c; 2000 lb to c.l. in bags, 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l., packed, pallets 15c, bags 16c; 3000 lb to c.l., pallets 16.2c; 2000 lb to c.l., bags, 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c, 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.7c per lb of briquet; packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l., bags 10.5c; less ton 11.4c. Delivered. Spot, add 0.25c; (Small size—weighing approx 2½ lb and containing 1 lb of Si.) Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.05c; 3000 lb to c.l., pallets 9.65c; 2000 lb to c.l., bags, 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Ton lots 2" x D, $4.25 per lb of contained Cb; less ton lots, $4.30. Delivered.

Ferrotantalum—Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $3.70 per lb of contained Cb plus Ta, delivered; less ton lot $3.75.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5.7%, Fe 20% approx). Contract, c.l. packed ½-in. x 12 M 20.00c per lb of alloy, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.55c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unistage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $110 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo., in 200-lb container, f.o.b. Langeloth and Washington, Pa. $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb of contained Mo. in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.

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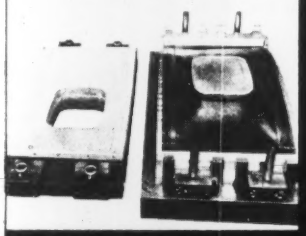

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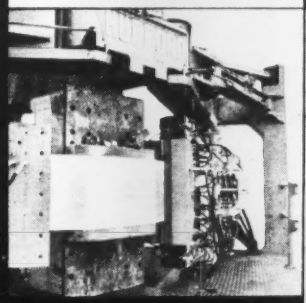

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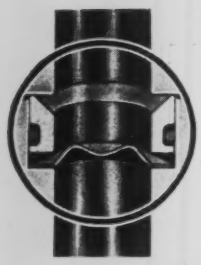

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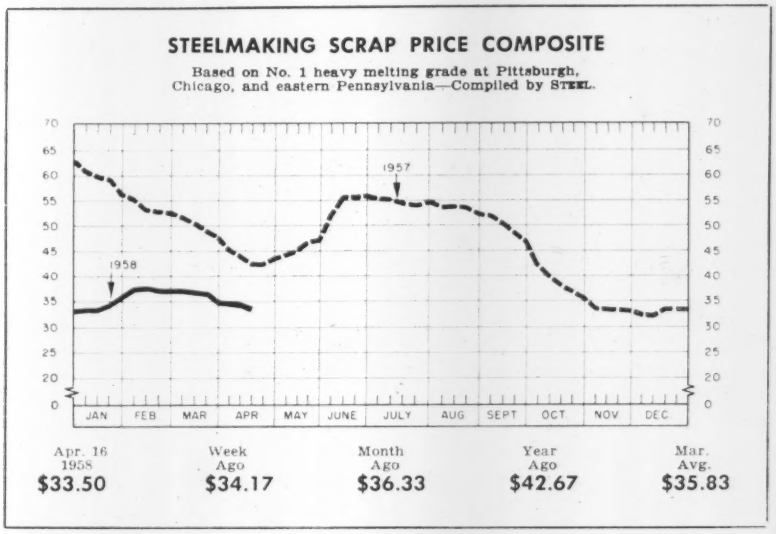
STEELMAKING SCRAP PRICE COMPOSITE
Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania—Compiled by STEEL.
1957
1958
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
Apr. 16 1958 $33.50
Week Ago $34.17
Month Ago $36.33
Year Ago $42.67
Mar. Avg. $35.83

Scrap Hit by Buyer Indifference

Sagging demand from steel mills and foundries forces prices down. STEEL's composite on the prime grade falls another 67 cents. It now stands at $33.50

Scrap Prices, Page 204

Philadelphia — Heavy melting scrap is slow with prices down an average of $1 a ton. One eastern Pennsylvania mill, operating substantially above the Mid-Atlantic average ingot rate, has held up shipments.

Most cast iron grades, including heavy breakable, malleable, and drop-broken machinery have sagged $1 to $2 a ton. Railroad lists opening this month, including the Pennsylvania's, are lower, No. 1 railroad heavy melting being quoted at $35.

New York—With buying light, stainless scrap has dropped $10 a ton, and even more on some grades. Steelmaking scrap prices for domestic shipment are untested with buying at a minimum. Cast, except for No. 1 cupola, is lower by $2 a ton.

There is less snap to export buying. Yards within the $3 freight to docks are moving the bulk of tonnage for boat loading.

Boston — Steelmaking grades of scrap are off $4 a ton here; brokers are paying $24-$25, shipping point, for No. 1 heavy melting. Domestic demand is slack with prices too low to attract tonnage for shipment to eastern Pennsylvania.

Buying for shipment to Worcester is grinding to a halt with open hearth operation at that point scheduled to cease July 1. With Worcester no longer an ingot producer, its influence on district steel scrap prices is removed.

Chicago—With steelmaking operations here off a point and a half from a week ago to 53 per cent of capacity, the scrap market has developed a still weaker tone. Most of the steel grades are quoted down $1 a ton. Cut structurals and plates are off $3, while some cast iron items, including malleable, are quoted $5 lower.

Pittsburgh—The local scrap market continues inactive, with consumer buying absent. Prices are generally unchanged, but the market tone is weak. Some brokers think recent bids on railroad lists warrant higher prices generally. Some No. 1 railroad heavy melting sold recently at $38 on a Pennsylvania list, but the bulk of the tonnage offered went at $37.50. Railroad specialties were moved at $45.36.

Cleveland—Quoted prices mean little. In the absence of representative mill purchases, they're largely brokers' ideas of what the market would command in a sale. For that reason, the quotations are nominal, and could be $1 up or down and still be considered representative.

Detroit—The absence of orders has kept prices on foundry grades from sliding more, but dealers and brokers think the buying price could be $6 to $7 beneath present nominal quotations. Local dealers think the market is going still lower this month.

Buffalo—Cast iron scrap dropped $2 a ton here last week, reversing a prolonged upward movement. Cupola cast sold at $42. No. 1 machinery cast was marked down a similar amount.

Cincinnati — The scrap market here is off $1 to $2 a ton. No new buying has been done to test prices at the lower level. Brokers say the market has touched bottom, anticipating stronger demand and steel operations next month.

St. Louis—The scrap market is generally holding at price levels recently established on small lot sales. Not much material is being offered, with demand sluggish. Spotty price

(*Please turn to Page* 209)

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Apr. 16, 1958. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Apr. 16	$33.50
Apr. 9	34.17
Mar. Avg.	35.83
Apr. 1957	43.57
Apr. 1953	42.88

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	29.00-30.00
No. 1 dealer bundles	33.00-34.00
No. 2 bundles	26.00-27.00
No. 1 busheling	33.00-34.00
No. 1 factory bundles	36.00-37.00
Machine shop turnings	*13.00-14.00*
Mixed borings, turnings	*13.00-14.00*
Short shovel turnings	19.00-20.00
Cast iron borings	*19.00-20.00*
Cut structurals:	
2 ft and under	39.00-40.00
3 ft lengths	38.00-39.00
Heavy turnings	28.00-29.00
Punchings & plate scrap	38.00-39.00
Electric furnace bundles	38.00-39.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	44.00-45.00
Unstripped motor blocks	26.00-27.00
Clean auto cast	44.00-45.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	*35.00-36.00*
Rails, 2 ft and under	54.00-55.00
Rails, 18 in. and under	54.00-55.00
Random rails	50.00-51.00
Railroad specialties	44.00-45.00
Angles, splice bars	47.00-48.00
Rails, rerolling	*57.00-58.00*

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	100.00-105.00
430 bundles & solids	110.00-115.00
430 turnings	50.00-52.00

CHICAGO

No. 1 hvy melt., indus.	*30.00-32.00*
No. 1 hvy melt., dealer	*28.00-29.00*
No. 2 heavy melting	*26.00-27.00*
No. 1 factory bundles	*33.00-34.00*
No. 1 dealer bundles	*30.00-31.00*
No. 2 bundles	*21.00-22.00*
No. 1 busheling, indus.	*30.00-32.00*
No. 1 busheling, dealer	*28.00-29.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Short shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*35.00-36.00*
Punchings & plate scrap	*37.00-38.00*

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	35.00-36.00
Unstripped motor blocks	30.00-31.00
Clean auto cast	*43.00-44.00*
Drop broken machinery	*43.00-44.00*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
R. R. malleable	*48.00-49.00*
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	53.00-54.00
Angles, splice bars	47.00-48.00
Axles	53.00-54.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	160.00-165.00
18-8 turnings	85.00-95.00
430 bundles & solids	90.00-100.00
430 turnings	45.00-50.00

YOUNGSTOWN

No. 1 heavy melting	*32.00-33.00*
No. 2 heavy melting	*22.00-23.00*
No. 1 busheling	*32.00-33.00*
No. 1 bundles	*29.00-30.00*
No. 2 bundles	*21.00-22.00*
Machine shop turnings	*9.00-10.00*
Short shovel turnings	*13.00-14.00*
Cast iron borings	*13.00-14.00*
Low phos.	*34.00-35.00*
Electric furnace bundles	*33.00-34.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*35.00-36.00*

CLEVELAND

No. 1 heavy melting	*29.00-30.00*
No. 2 heavy melting	*19.00-20.00*
No. 1 factory bundles	*31.00-32.00*
No. 1 bundles	*29.00-30.00*
No. 2 bundles	*20.00-21.00*
No. 1 busheling	*29.00-30.00*
Machine shop turnings	*7.00-8.00*
Short shovel turnings	*11.00-12.00*
Mixed borings, turnings	*11.00-12.00*
Cast iron borings	*11.00-12.00*
Cut foundry steel	*34.00-35.00*
Cut structurals, plates 2 ft and under	*35.00-36.00*
Low phos, punchings & plate	*30.00-31.00*
Alloy free, short shovel turnings	*16.00-17.00*
Electric furnace bundles	*30.00-31.00*

Cast Iron Grades

No. 1 cupola	*42.00-43.00*
Charging box cast	*33.00-34.00*
Heavy breakable cast	*33.00-34.00*
Stove plate	*42.00-43.00*
Unstripped motor blocks	*25.00-26.00*
Brake shoes	*33.00-34.00*
Clean auto cast	*42.00-43.00*
Burnt cast	*30.00-31.00*
Drop broken machinery	*47.00-48.00*

Railroad Scrap

R.R. malleable	60.00-61.00
Rails, 2 ft and under	*56.00-57.00*
Rails, 18 in. and under	*57.00-58.00*
Rails, random lengths	*49.00-50.00*
Cast steel	*44.00-45.00*
Railroad specialties	*47.00-48.00*
Uncut tires	*40.00-41.00*
Angles, splice bars	*46.00-47.00*
Rails, rerolling	*51.00-52.00*

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 clips, bundles, solids	75.00-80.00
430 turnings	40.00-50.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	32.00
No. 2 heavy melting	30.00
No. 1 bundles	32.00
No. 2 bundles	*23.00*
No. 1 busheling	*32.00*
Machine shop turnings	16.00
Short shovel turnings	18.00

Cast Iron Grades

No. 1 cupola	44.00
Charging box cast	33.00
Heavy breakable cast	33.00
Unstripped motor blocks	33.00
Clean auto cast	45.00
Stove plate	*39.50*

Railroad Scrap

No. 1 R.R. heavy melt	37.00
Rails, 18 in. and under	54.00
Rails, random lengths	48.00
Rails, rerolling	56.00
Angles, splice bars	47.00

BIRMINGHAM

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	*25.00-26.00*
No. 1 bundles	*30.00-31.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*30.00-31.00*
Cast iron borings	12.00-13.00
Machine shop turnings	*22.00-23.00*
Short shovel turnings	*23.00-24.00*
Bar crops and plates	38.00-39.00
Structurals & plates	38.00-39.00
Electric furnace bundles	35.00-36.00
Electric furnace:	
2 ft and under	34.00-35.00
3 ft and under	33.00-34.00

Cast Iron Grades

No. 1 cupola	*49.00-50.00*
Stove plate	*48.00-49.00*
Unstripped motor blocks	*38.00-39.00*
Charging box cast	22.00-23.00
No. 1 wheels	36.00-37.00

Railroad Scrap

No. 1 R.R. heavy melt.	*33.00-34.00*
Rails, 18 in. and under	*47.00-48.00*
Rails, rerolling	*47.00-48.00*
Rails, random lengths	*41.00-42.00*
Angles, splice bars	*41.00-42.00*

PHILADELPHIA

No. 1 heavy melting	*37.00*
No. 2 heavy melting	*34.00*
No. 1 bundles	*37.00*
No. 2 bundles	*26.00*
No. 1 busheling	*37.00*
Electric furnace bundles	*38.00*
Mixed borings, turnings	18.50†
Short shovel turnings	21.00†
Machine shop turnings	18.50†
Heavy turnings	*38.00*
Structurals & plate	*41.00-42.00*
Couplers, springs, wheels	*44.50*
Rail trbps, 2 ft. & under	*57.00-59.00*

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	*42.00*
Malleable	*60.00-61.00*
Drop broken machinery	*49.00*

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	32.00-33.00
No. 2 bundles	18.00-19.00
Machine shop turnings	8.00-9.00†
Mixed borings, turnings	10.00-11.00†
Short shovel turnings	12.00-13.00†
Low phos (structurals & plates	35.00-36.00†

Cast Iron Grades

No. 1 cupola	35.00-36.00
Unstripped motor blocks	*26.00-27.00*
Heavy breakable	*33.00-34.00*

Stainless Steel

18-8 sheets, clips, solids	*140.00-145.00*
18-8 borings, turnings	*50.00-55.00*
410 sheets, clips, solids	*50.00-55.00*
430 sheets, clips, solids	*70.00-75.00*

BUFFALO

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 2 bundles	23.00-24.00
No. 1 busheling	28.00-29.00
Mixed borings, turnings	14.00-15.00
Machine shop turnings	12.00-13.00
Short shovel turnings	15.00-16.00
Cast iron borings	14.00-15.00
Low phos. structurals and plate, 5 ft and under	33.00-34.00
2 ft and under	37.00-38.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	*41.00-42.00*
No. 1 machinery	*46.00-47.00*

Railroad Scrap

Rails, random lengths	47.00-48.00
Rails, 3 ft and under	53.00-54.00
Railroad specialties	37.00-38.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*28.50-29.50*
No. 2 heavy melting	*25.50-26.50*
No. 1 bundles	*28.50-29.50*
No. 2 bundles	19.00-20.00
No. 1 busheling	*28.50-29.50*
Machine shop turnings	12.00-13.00
Mixed borings, turnings	11.00-12.00
Short shovel turnings	14.00-15.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	36.00-37.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable cast	32.00-33.00
Charging box cast	32.00-33.00
Drop broken machinery	*45.00-46.00*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, 18 in. and under	*52.00-53.00*
Rails, random lengths	*43.00-44.00*

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	32.00†
No. 2 heavy melting	30.00†
No. 2 bundles	22.00†
Machine shop turnings	*15.00†*
Crushed turnings	19.00†
Low phos. plates, structurals	*36.00†*

Cast Iron Grades

No. 1 cupola	*38.00†*
Heavy breakable	*30.00†*
Unstripped motor blocks	*33.50*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*24.00-25.00*
No. 2 heavy melting	*19.00-20.00*
No. 1 bundles	*24.00-25.00*
No. 2 bundles	*14.00-15.00*
No. 1 busheling	*24.00-25.00*
Machine shop turnings	7.00-8.00†
Mixed borings, turnings	7.00-8.00
Short shovel turnings	8.00-9.00
No. 1 cast	29.00-30.00
Mixed cupola cast	28.00-29.00
No. 1 machinery cast	33.00-34.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*21.00-22.00*
No. 2 heavy melting	17.00-18.00
No. 1 bundles	*23.00-24.00*
No. 2 bundles	12.00-13.00
No. 1 busheling	*22.00-23.00*
Machine shop turnings	*5.00-6.00*
Mixed borings, turnings	*6.00-7.00*
Short shovel turnings	*7.00-8.00*
Punchings & plate	*27.00-28.00*

Cast Iron Grades

No. 1 cupola	28.00-29.00
Stove plate	23.00-24.00
Charging box cast	22.00-23.00
Heavy breakable	21.00-22.00
Unstripped motor blocks	*11.00-12.00*
Clean auto cast	*29.00-30.00*

SEATTLE

No. 1 heavy melting	*30.00*
No. 2 heavy melting	*28.00*
No. 1 bundles	*24.00*
No. 2 bundles	23.00
Machine shop turnings	16.00
Mixed borings, turnings	16.00
Electric furnace No. 1	38.00

Cast Iron Grades

No. 1 cupola	31.00
Heavy breakable cast	28.00
Unstripped motor blocks	23.00
Stove plate (f.o.b. plant)	21.00

LOS ANGELES

No. 1 heavy melting	32.00
No. 2 heavy melting	30.00
No. 1 bundles	28.00
No. 2 bundles	20.00
Machine shop turnings	9.00
Shoveling turnings	11.00
Cast iron borings	10.00
Cut structurals and plate 1 ft and under	43.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	38.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	22.00
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Short shovel turnings	15.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	42.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

No. 1 heavy melting	*30.00*
No. 2 heavy melting	*26.00*
No. 1 bundles	*30.00*
No. 2 bundles	*23.00*
Mixed steel scrap	*25.00*
Mixed borings, turnings	*15.00*
Busheling, new factory:	
Prepared	*30.00*
Unprepared	*24.00*
Short steel turnings	*19.00*

Cast Iron Grades‡

No. 1 machinery cast	45.00-50.00

†Nominal.
‡F.o.b. Hamilton, Ont.

Where we stand in the fight against CANCER ...and why your dollars are urgently needed now!

DECISIVE PROGRESS has been made in the fight against cancer in the last decade. Today one in every three persons who have cancer is saved. A few years ago it was only one in four.

Still more lives can be saved with what doctors know *now*, if all adults will have a health checkup every year. Many cancers are curable if discovered early and treated promptly.

The major hope for the future conquest of cancer lies in research. About twenty million Americans living today are marked for death from cancer unless research finds new means of curing the disease, or preventing its onset.

What new knowledge has been won to brighten cancer's darkness? High on the list is the discovery of chemicals which cause some cancers to shrink . . . and put victims of this disease back on their feet for a time. There are sound, scientific reasons to believe that more effective chemicals will come which may possibly *cure* one or more forms of cancer.

Equally remarkable are the advances in surgery for cancer . . . permitting wider removal of malignant growths with less risk to patients and far greater chances to control the disease.

The scoreboard of cancer progress also includes methods for treating some cancers with hormones, which prolong the active, useful lives of many patients . . . tests for early diagnosis of some common forms of cancer . . . development of X rays with power undreamed of 10 years ago . . . incredibly delicate techniques by which the living chemistry of a single body cell can be studied.

Immense new research projects are under way and might be expanded to answer such questions as:

> Are the tiny organisms called viruses significant factors in the cause of cancer in man, as they are in some cancers in animals? Why do cancers grow rapidly in some patients, slowly in others? If some people are immune or more immune to cancer than others, how can that immunity be strengthened? What elements in our environment may be causing cancer?

Important findings must be moved from the laboratory table to the hospital bed. The step from test tube to patient is difficult, time-consuming and costly. As research goes forward, and new leads open up, more and more work will be done directly with patients with cancer. Thus, research costs will snowball as science continues to press towards its goal.

Your support of the American Cancer Society's Crusade has already brought significant gains in the control of cancer. More lie ahead . . . will you make them possible? Let your dollars work for you and for your children and for their children.

Send your check today to "Cancer," in care of your local post office.

AMERICAN CANCER SOCIETY

Fight CANCER with a checkup and a check

Brass Mills Still Down

The slump doesn't seem to be worsening, but no pickup is expected in the second quarter. Inco's Wingate says nickel price won't be upped. Zinc stocks rise

Nonferrous Metal Prices, Pages 208 & 209

BRASS MILLS may have felt the worst of the business pinch, but orders continue to trickle in.

Companies estimate business in the first quarter was 8 to 25 per cent under that of the corresponding period last year. Industry shipments for January and February dropped 20 per cent below those of the first two months in 1957. Actually, the brass mill decline started around 18 months ago: Shipments in 1957 were 14 per cent under 1956's.

No Change — Mills aren't optimistic about the second quarter. Comments range from "we anticipate a pickup of 5 per cent" to "we hope to continue at current levels, but a further decline is possible." Consensus: Sales will probably parallel the first quarter's.

General business conditions explain the brass mill situation: The industry's three largest markets (electrical, construction, and automotive) are all down. Of these, construction holds the best chance for early improvement, say mill spokesmen.

One Bright Spot—Any firming of business should bring an immediate improvement in sales because of low customer inventories. One company estimates customers are carrying a maximum inventory of 30 days; another says three to four weeks.

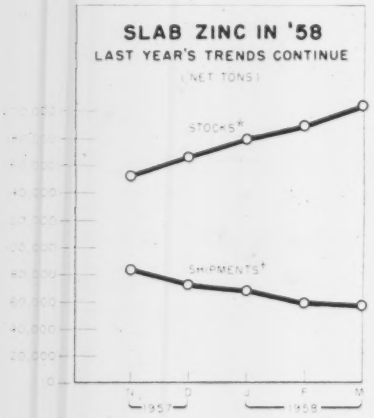
Employment is down as much as 25 to 30 per cent in some companies. Many mill workers are on a short week. Competition is keen, and there are scattered reports of price cutting.

Imports—A major industry problem is the increasing amount of low-priced mill products coming in from overseas. Producers say the situation is especially severe in screw machine products, construction goods, plumbing and heating materials.

Imports rose from 31 million lb in 1950 to 108 million lb last year. They now account for 6 per cent of the total U. S. market. Exports have fallen drastically. If imports continue to increase, the industry may petition for tariff relief.

Zinc Stocks Climb

Stocks of unsold slab zinc went up for the fourth straight month in March to 203,641 tons (see chart) and now stand at their highest point since May, 1954, reports the American Zinc Institute Inc.



Production rose about 4000 tons to 72,274 tons in March, but this was not surprising since February was a short month. Domestic shipments were only a few tons under the total in February, but government takes were less. With zinc stockpiling going out this month, watch for stocks to continue their upward climb unless production is trimmed still more.

Nickel Price Stable

Don't look for any revision in the price of nickel in the near future. Rumors of a pending reduction of around 6.5 cents have reportedly led to the postponement of purchases by some consumers.

When asked to comment, Henry S. Wingate, president of International Nickel Co., told STEEL: "Inco's price of nickel remains at 74 cents a pound, and the company has no intention of changing that price."

More Aluminum Cans

Esso Standard Oil Co. will use more aluminum cans to package its motor oil. Under a contract with Reynolds Metals Co. last fall, Esso agreed to take around 35 million 1-quart cans for its Bayonne, N. J., refinery.

Esso now says it will begin using 1-quart aluminum oil cans at its Baltimore refinery in May. Requirements are estimated at 20 million to 25 million units.

Elsewhere, the aluminum market is quiet following the 2 cent a pound price cut in pig. The first quarter primary production figure isn't out, but estimates peg it at close to 395,000 tons. Output in 1957's first quarter was 401,795 tons.

NONFERROUS PRICE RECORD

	Price Apr. 16	Last Change		Previous Price	Mar. Avg	Feb. Avg	Apr., 1957 Avg
Aluminum	24.00	Apr.	1, 1958	26.00	26.000	26.000	25.000
Copper	23.50–25.00	Apr.	8, 1958	24.00–25.00	24.163	24.298	31.598
Lead	11.80	Apr.	1, 1958	12.80	12.800	12.800	15.800
Magnesium	35.25	Aug.	13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec.	6, 1956	64.50	74.000	74.000	74.000
Tin	92.875	Apr.	16, 1958	92.375	93.425	93.818	99.276
Zinc	10.00	July	1, 1957	10.50	10.000	10.000	13.500

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. shipping point; MAGNESIUM, pig, 99.8%, Velasco, Tex.

Aluminum pig • ingot • extrusion billets now available from Olin Aluminum

Expanding Olin Aluminum can now handle your requirements for pig, ingot and extrusion billets in a wide range of specifications.

For information on shipments and availability of special alloys and sizes, contact our nearest sales office, or write: Aluminum Division, Olin Mathieson Chemical Corporation, 400 Park Avenue, New York 22, N. Y.

® AND "OLIN ALUMINUM" ARE TRADEMARKS

Pure Pig and Ingot	99.50 through 99.90%
Standard Alloy Pig	2108 through 2919 alloy, (most types) also E C
Casting Alloys – Sand, Permanent-Mold, Die Casting	13 through 363 alloy (most types)
Rotor Ingot	100 and A100 alloy
Extrusion Billet – TM	3" through 6" diameter
Extrusion Billet – DC	4-7/16" through 16" diameter, lengths 11" and over 22"

Atlanta
TRinity 2-5824
Baltimore
VAlley 3-1426
Birmingham
VErnon 3-3894
Boston
VOlunteer 2-2148
Chicago
COrnelia 7-8844
Cincinnati
CApitol 1-6030
Cleveland
PRospect 1-4444
Dallas
FLeetwood 7-1591
Dayton
BAldwin 4-9631
Detroit
LIberty 9-5500
Houston
OVerland 2-3645
Indianapolis
WAlnut 5-0490
Jackson, Mich.
STate 2-4900
Kansas City
PLaza 3-2055
Los Angeles
DUnkirk 5-3231
Memphis
JAckson 7-2571
Miami
PLaza 7-0635
Milwaukee
BRoadway 3-8266
Minneapolis
UNion 9-9289
New Haven
SPruce 7-1491
New York
PLaza 1-4540
Philadelphia
MOhawk 4-6100
Pittsburgh
GRant 1-3855
St. Louis
PArkview 6-0247
San Francisco
YUkon 2-8060
Syracuse
GRanite 2-7551
Tulsa
LUther 4-2726

OLIN MATHIESON CHEMICAL CORPORATION
OLIN ALUMINUM

Symbol of New Standards of Quality and Service in the Aluminum Industry

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 24.00; ingots, 26.10, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 27.90; No. 43, 27.70; No. 195, 28.70; No. 214, 29.50; No. 356, 27.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 23.50-24.50, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per ton, ton lots.

Cadmium: Sticks and bars, $1.55 per lb deld.

Cobalt: 97-99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100 lb case; $2.07 per lb under 100 lb.

Columbium: Powder, $55-90 per lb, nom.

Copper: Electrolyic, 25.00 deld.; custom smelters, 23.50; lake, 25.00 deld.; fire refined, 24.75 deld.

Germanium: First reduction, $179.17-197.31 per lb; intrinsic grade, $197.31-220 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-90 nom. per troy oz.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 98 + %, 50-100 lb, cups or ingots, $12; rod, $15; shot or wire, $16. 100-500 lb, cups or ingots, $10.50; rod, $14; shot or wire, $15, f.o.b. Minneapolis.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. thick, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $232-237 per 76-lb flask.

Molybdenum: Unalloyed, turned extrusions, 3.75-5.75 in. round, $9.60 per lb in lots of 2500 lb or more, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 779.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel, 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty, New York basis, add 1.01. Nickel oxide sinter, 71.25 per lb of nickel content before 1 cent freight allowance, f.o.b. Copper Cliff, Ont.

Osmium: $70-100 per troy oz nom.

Palladium: $19-21 per troy oz.

Platinum: $68-75 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: $7.00 per lb, commercial grade.

Silver: Open market, 88.625 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Rod, $60 per lb; sheet, $55 per lb.

Tellurium: $1.65-1.85 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 92.875.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max.), $2.05; grade A-2 (0.5% Fe max.), $1.85 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $3.15 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.85.

Zinc: Prime Western, 10.00; brass special, 10.25; intermediate, 10.50, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 11.00; special high grade, 11.25 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.75; No. 5, 14.25 deld.

Zirconium: Sponge, commercial grade, $5-10 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00-24.50; No. 12 foundry alloy (No. 2 grade), 21.25-21.50; 5% silicon alloy, 0.60 Cu max., 24.00-24.25; 13 alloy, 0.60 Cu max., 24.00-24.25; 195 alloy, 24.25-25.50; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 21.25; grade 3, 20.00; grade 4, 18.00.

Brass Ingot: Red brass, No. 115, 25.25; tin bronze, No. 225 34.00, No. 245, 28.75; high-leaded tin bronze, No. 305, 29.25, No. 1 yellow, No. 405, 20.75; manganese bronze, No. 421, 23.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.80, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.78, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 30.355; l.c.l., 30.98. Weatherproof, 30,000-lb lots, 32.53; l.c.l., 33.28. Magnet wire deld., 38.43, before quantity discounts.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $9.50-15.35; sheared mill plate, $8.00-11.50; wire, $7.50-11.50; forging billets, $6.00-7.60; hot-rolled and forged bars, $6.15-7.90.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, $24.00; plate, $12.50-19.20; H.R. strip, $12.50-22.90, $11.00-17.40.

ZIRCONIUM

C.R. strip, $15.90-31.25; forged or H.R. bars, ribbon zinc in coils, 20.50; plates, 19.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strips, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100 and 3003 mill finish (30,000 lb base; freight allowed).

Range Inches	Flat Sheet	Coiled Sheet
Thickness		
0.249-0.136	43.10-47.60	.....
0.135-0.096	43.60-48.70	40.50-41.10
0.095-0.077	44.30-50.50	40.60-41.30
0.076-0.061	44.90-52.80	40.80-42.00
0.060-0.048	45.60-55.10	41.40-43.10
0.047-0.038	46.20-57.90	41.90-44.50
0.037-0.030	46.60-62.90	42.30-46.30
0.029-0.024	47.20-54.70	42.60-47.00
0.023-0.019	48.20-58.10	43.70-45.40
0.018-0.017	49.00-55.40	44.30-46.00
0.016-0.015	49.90-56.30	45.10-46.80
0.014	50.90	46.10-47.80
0.013-0.012	52.10	46.80
0.011	53.10	48.00
0.010-0.0095	54.60	49.40
0.009-0.0085	55.90	50.90
0.008-0.0075	57.50	52.10
0.007	59.00	53.60
0.006	60.60	55.00

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	41.70	46.50
5050-F	42.80	47.60
3004-F	43.80	49.50
5052-F	44.40	50.20
6061-T6	44.90	51.00
2024-T4	48.60	55.40
7075-T6*	56.40	64.00

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	78.20	75.20	....	....
0.156-0.172	66.20	63.40	....	....
0.188	66.20	63.40	....	81.60
0.219-0.234	63.00	61.50	....	....
0.250-0.281	63.00	61.50	....	77.90
0.313	63.00	61.50	....	74.20
0.344	62.50	....	....	....
Cold-Finished				
0.375-0.547	62.50	61.30	74.80	69.80
0.563-0.688	62.50	61.30	71.10	65.50
0.719-1.000	61.00	59.70	64.90	61.70
1.063	61.00	59.70	....	59.60
1.125-1.500	58.60	57.40	62.80	59.60
Rolled				
1.563	57.00	55.70	....	....
1.625-2.000	56.30	54.90	....	57.50
2.125-2.500	54.80	53.40	....	....
2.563-3.375	53.20	51.70	....	....

Forging Stock: Round, Class 1, random lengths, diam. 0.688-8 in., "F" temper: 2014, 41.50-54.30; 6061, 40.90-54.30; 7075, 42.90-56.30; 7079, 43.40-56.80.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$19.40	2	$ 59.90
1	30.50	4	165.05
1¼	41.30	6	296.10
1½	49.40	8	445.55

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.40-47.00	46.80-48.50
12-14	45.70-47.20	47.10-48.80
15-17	45.90-47.90	47.30-49.10
18-20	46.50-48.30	48.10-49.60

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, .25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

Aluminum: 1100 clippings, 12.00-12.50; old sheets, 9.00-9.50; borings and turnings, 5.00-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	48.13b	45.36c	....	48.32	21.000	21.000	20.250
Yellow Brass	42.69	31.03d	43.23	45.60	16.125	15.875	14.500
Low Brass, 80%	44.90	44.84	45.44	47.71	17.875	17.625	17.125
Red Brass, 85%	45.67	45.61	46.21	48.48	18.625	18.375	17.875
Com. Bronze, 90%	46.98	46.92	47.52	49.54	19.250	19.000	18.500
Manganese Bronze	50.81	44.91	55.44	....	14.875	14.625	14.125
Muntz Metal	45.19	41.00	....	....	15.125	14.875	14.375
Naval Brass	47.07	41.38	54.13	50.48	14.875	14.625	14.125
Silicon Bronze	52.84	52.03	52.88	54.77	20.625	20.375	19.625
Nickel Silver, 10%	57.93	60.26	60.26	....	21.125	20.875	10.562
Phos. Bronze, A-5%	67.17	67.67	67.67	68.85	21.875	21.625	20.625

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, or any or all kinds of scrap, add 1 cent per lb.

5.50; crankcase, 9.00-9.50; industrial castings, 9.00-9.50.

Copper and Brass: No. 1 heavy copper and wire, 17.25-17.75; No. 2 heavy copper and wire, 15.50-15.75; light copper, 13.25-13.75; No. 1 composition red brass, 14.50-15.00; No. 1 composition turnings, 13.50-14.00; new brass clippings, 13.00-13.50; light brass, 8.00-8.50; heavy yellow brass, 10.00-10.50; new brass rod ends, 11.00-11.50; auto radiators, unsweated, 11.00-11.50; cocks and faucets, 12.00-12.50; brass pipe, 12.00-12.50.

Lead: Heavy, 7.50-8.00; battery plates, 2.75-3.00; linotype and stereotype, 9.75-10.25; electrotype, 9.00-9.50; mixed babbitt, 10.50-11.00.

Monel: Clippings, 28.00-29.00; old sheets, 25.00-26.00; turnings, 20.00-23.00; rods, 28.00-29.00.

Nickel: Sheets and clips, 42.00-45.00; rolled anodes, 42.00-45.00; turnings, 37.00-40.00; rod ends, 42.00-45.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 2.75-3.00; old diecast scrap, 1.50-1.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 15.50-16.25; 3003 clippings, 15.50-16.25; 6151 clippings, 15.50-16.50; 5052 clippings, 15.00-15.75; 2014 clippings, 15.00-15.25; 2017 clippings, 15.00-15.25; 2024 clippings, 15.00-15.25; mixed clippings, 14.00-14.75; old sheets, 11.50-12.25; old cast, 11.50-12.25; clean old cable (free of steel), 14.50-15.25; borings and turnings, 12.00-13.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 51.00; light scrap, 46.00; turnings and borings, 31.00.

Copper and Brass: No. 1 heavy copper and wire, 20.00; No. 2 heavy copper and wire 18.00; light copper, 15.75; refinery brass (60% copper) per dry copper content, 17.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 20.00; No. 2 heavy copper and wire, 18.00; light copper, 15.75; No. 1 composition borings, 17.25; No. 1 composition solids, 17.75; heavy yellow brass solids, 12.25; yellow brass turnings, 11.50; radiators, 13.75.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quanties)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 41.79; oval, 40.00, 5000-10,000 lb; electrodeposited, 31.25, 2000-5000 lb lots; cast, 36.25, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 110.50; 200-499 lb, 109.00; 500-999 lb, 108.50; 1000 lb or more, 108.00.

Zinc: Balls, 16.00; flat tops, 16.00; flats, 19.25; ovals, 18.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb in 100-lb drums.

Chromic Acid: 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30; f.o.b. Detroit.

Copper Cyanide: 100-200 lb, 68.40; 300-900 lb, 66.40; 1000-19,900 lb, 64.40.

Copper Sulphate: 100-1900 lb, 13.70; 2000-5900 lb, 11.70; 6000-11,900 lb, 11.45; 12,000-22,900 lb, 11.20; 23,000 lb or more, 10.70.

Nickel Chloride: 100 lb, 48.50; 200 lb, 46.50; 300 lb, 45.50; 400-999 lb, 43.50; 10,000 lb or more, 40.50.

Nickel Sulphate: 5000-22,000 lb, 33.50; 23,000-35,900 lb, 33.00; 36,000 lb or more, 32.50.

Sodium Cyanide: 100 lb, 27.60; 200 lb, 25.90; 400 lb, 22.90; 1000 lb, 21.90; f.o.b. Detroit.

Sodium Stannate: Less than 100 lb, 74.30; 100-600 lb, 65.20; 700-1900 lb, 62.50; 2000-9900 lb, 60.60; 10,000 lb or more, 59.30.

Stannous Chloride (anhydrous): Less than 25 lb, 163.50; 25 lb, 128.50; 100 lb, 113.50; 400 lb, 111.00; 5200-19,600 lb, 98.80; 20,000 lb or more, 86.60.

Stannous Sulphate: Less than 50 lb, 126.40; 50 lb, 96.40; 100-1900 lb, 94.40; 2000 lb or more, 92.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 203*)

cutting is reported in stove plates and No. 2 bundles; both are off $1 to $2 a ton.

Birmingham — A district open-hearth scrap consumer returned to the market last week with limited orders. It paid $3 less than it did on previous purchases.

Houston—There is no significant demand for scrap in the Southwest. Modest April mill commitments are filled, and Mexican demand has quieted down.

One Texas mill indicates its 15-month inventory will preclude early purchases.

Los Angeles—A few dealers report an easing in the scrap market, but sales are insufficient to provide an accurate price test.

San Francisco — Steel scrap is moving slowly in this market. Dealers think exports will pick up.

Seattle—The recent advance on the better grades of steel scrap has failed to hold.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4700 tons, Cross Bronx Parkway viaduct structure, 58-2, Bronx, N. Y., to Apollo Steel Co., New York; Slattery Contracting Co., Mespath, N. Y., general contractor.

4000 tons, passenger terminal, Pan-American World Airways, Idlewild, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.; direct by owner.

1245 tons, buildings, including research laboratory, Charles Pfizer & Co. Inc., Groton, Conn., to Elizabeth Iron Works, Elizabeth, N. J.; W. J. Barney Corp., New York, general contractor.

800 tons, National Bank of Commerce addition and garage, Seattle, to Isaacson Iron Works, Seattle; Cawdrey & Vemo, Seattle, general contractor.

750-tons, state highway structure, Ogdensburg, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.; A. S. Wikstrom Inc., Skaneateles, N. Y., general contractor.

700 tons, east and west ramps, Route 46 interchange, Garden State Parkway, Clifton, N. J., to Harris Structural Steel Co., New York.

640 tons, Cathedral High School, Springfield, Mass., to Haarman Steel Co., Holyoke, Mass.; Daniel O'Connell Sons Inc., Holyoke, general contractor.

620 tons, three span, continuous welded, deck girder bridge, Hamlet Avenue, Woonsocket, R. I., to Tower Iron Works, Providence, R. I.; Holloran Construction Co., contractor.

615 tons, engineering center, Esso Research & Engineering Co., Florham Park, N. J., affiliate of Standard Oil Co. (New Jersey), to Central Structural Steel Co. Inc., New York; Frank Briscoe Co. Inc., general contractor.

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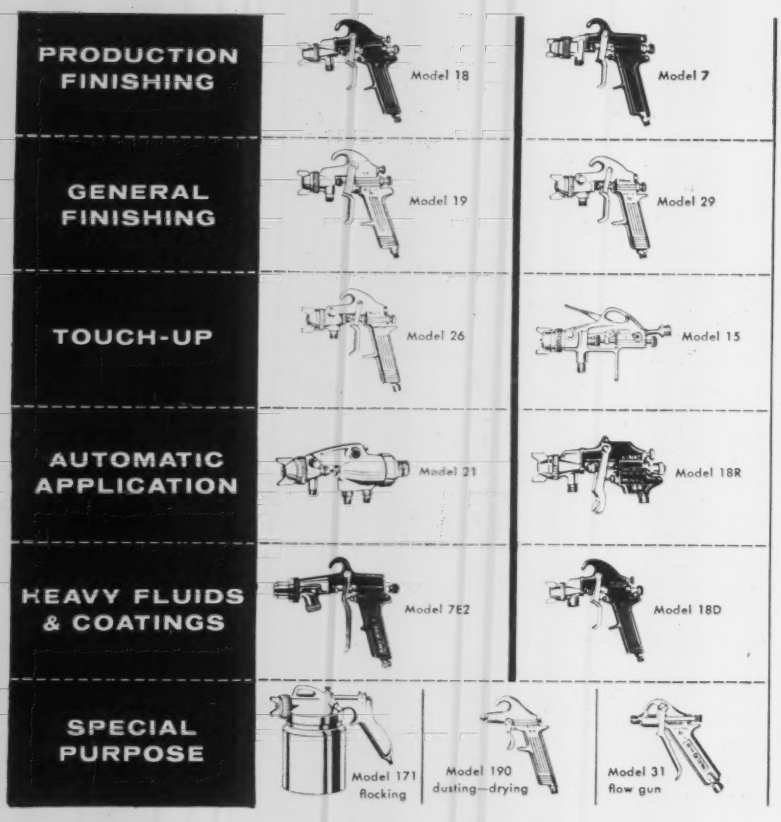

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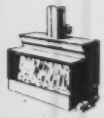
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335 tons, state highway bridge, Route 102 Section 2D, Warren-Hunterdon counties, New Jersey, to Irvington Steel & Iron Works, Irvington, N. J.; Charles Vachris Co., New York, general contractor.

300 tons, building, Upton, N. Y., to Belmont Iron Works, Norristown, Pa.; Burns & Roe, New York, general contractor.

205 tons, warehouse, Kimberley-Clark Corp., New Milford, Conn., to Topper & Griggs (Bethlehem Fabricators Inc.), Hartford, Conn.; W. J. Megin Inc., Naugatuck, Conn., general contractor.

130 tons, welded plate girder bridge, 2 spans 100 ft each, Nashua, N. H., to Lyons Iron Works, Manchester, N. H.; Louis A. Scheyd, Hooksett, N. H., general contractor.

STRUCTURAL STEEL PENDING

4850 tons, plate girder and I-beam bridge; also five I-beam bridges, Harrisburg, Pa.; bids Apr. 25, Harrisburg.

3350 tons, Canadian approach, six truss spans, 251.3 ft each; and three 3-span continuous girders, 382.5 ft each, superstructure, Ogdensburg, N. Y.-Grenville, Ont., bridge; bids Apr. 24, Albany, N. Y.

3200 tons, U. S. approach span superstructure, six truss spans, 251.3 ft each, and two 4-span continuous girders, 510 ft each, Ogdensburg, N. Y.-Grenville, Ont.; bids Apr. 24, Albany, N. Y.

1430 tons, six state bridges, four welded plate girder structures and two rolled beam girders, Scajaquada Creek Expressway, Section 2, Erie County, New York; bids Apr. 24, Albany, N. Y.

13,500 tons, lower level deck, George Washington Bridge, New York; Port Authority of New York to advertise for estimates about May 1.

1280 tons, building, ordnance shop area, Ft. Knox, Louisville; Algernon Blair Co., Montgomery, Ala., low on general contract.

1200 tons, Tukey's Bridge, Portland, Maine; bids Apr. 30, Augusta, Maine; also 27,600 linear feet of steel piling.

120 tons, state highway bridge, including structurals (75 tons) and bars, Minersville-Pottsville, Pa.; bids Apr. 25, Harrisburg, Pa.

100 tons, three-span WF beam bridge, Barre, Vt.; also 45 tons of reinforcing bars.

REINFORCING BARS . . .

REINFORCING BARS PLACED

895 tons, Cathedral High School, Springfield, Mass., to Joseph T. Ryerson & Son Inc., Boston; Daniel O'Connell Sons Inc., Holyoke, Mass., general contractor.

360 tons, viaduct structure, Lackawanna-Buffalo, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Bero Construction Co., Waterloo, N. Y., general contractor.

300 tons, National Bank of Commerce garage, Seattle, to Soule Steel Co., Seattle.

250 tons, junior high school, Towson, Md., to Sterling Steel Products Co., Baltimore (bars) and Potts Mfg. Co., Mechanicsburg, Pa. (structurals); Joseph F. Hughes & Co., Baltimore, general contractor.

240 tons, regional junior high school, Boxford, Mass., to Northern Steel Inc., Medford, Mass.; E. H. Porter Construction Co., Peabody, Mass., general contractor; 85 tons structurals, Security Steel & Wire Works Inc., Boston.

210 tons, state highway bridge, Ogdensburg, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; A. S. Wikstrom Inc., Skaneateles, N. Y., general contractor.

REINFORCING BARS PENDING

1575 tons, including 120 tons of highway mesh, plate girder, and I-beam bridge, also five I-beam structures, Harrisburg, Pa.; bids Apr. 25, Harrisburg, Pa.

985 tons, steel sheet piling; bids in; U. S. Engineer, Detroit.

900 tons, piling, also 300 tons of reinforcing, two Snake River bridges; general contract to Hoffman Construction Co., Portland, Oreg., low at $720,492 by the Oregon Highway Commission.

420 tons, reinforced concrete bridges (two), Franconia, N. H.; bids in.

RAILS, CARS . . .

RAILROAD CARS PENDING

Army Transportation Supply, St. Louis, 25 seventy-ton hoppers; bids Apr. 21.

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from blowers to bobbins...

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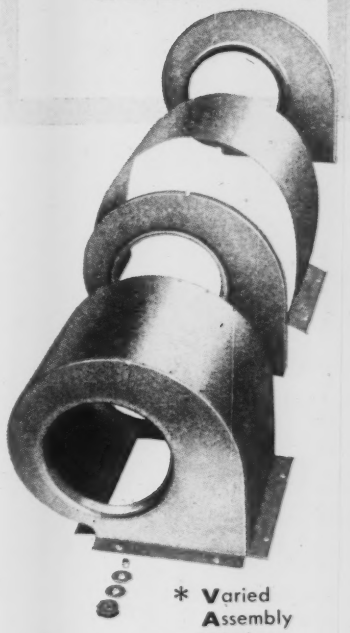

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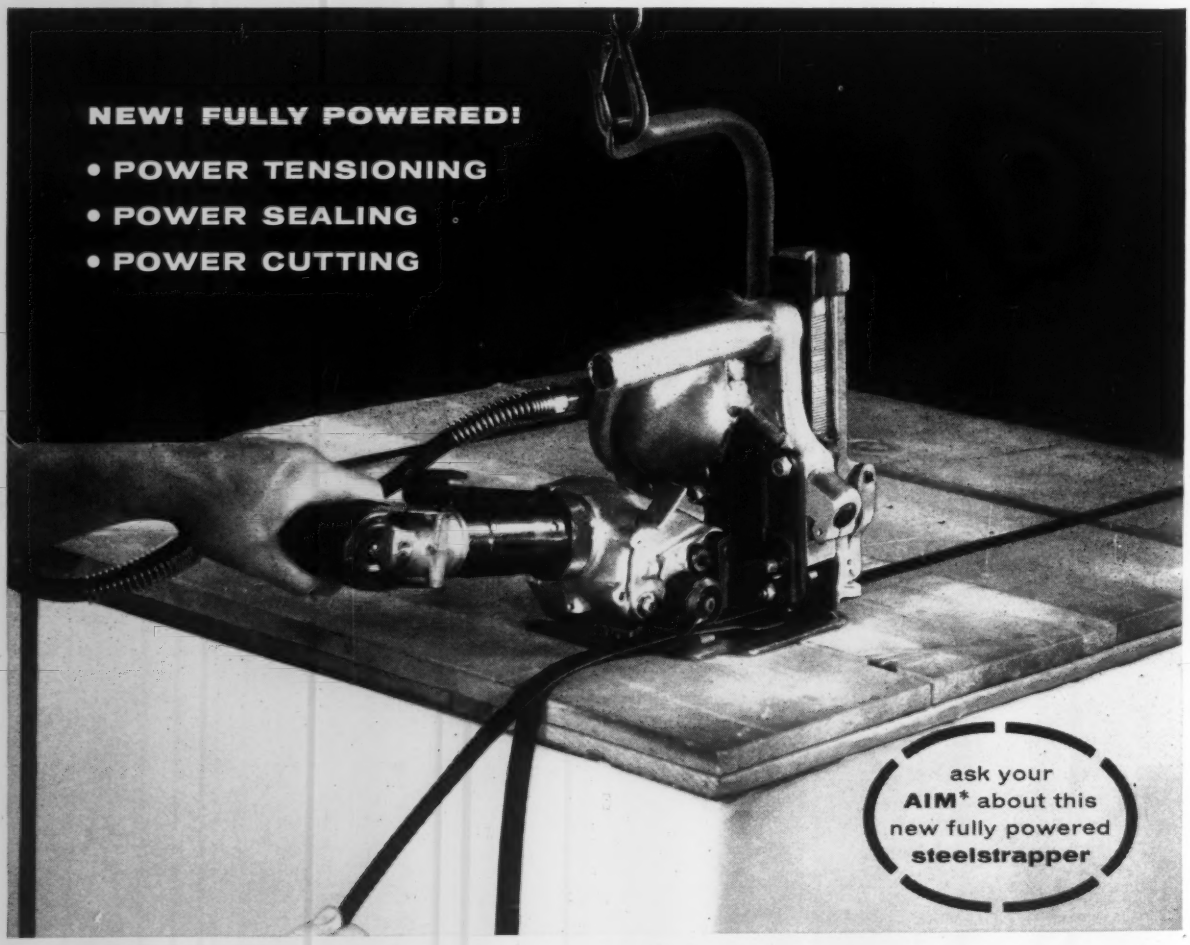


Announcing another Acme Steel first...

The new, fully powered A4 Steelstrapper

ACME STEEL COMPANY is first to offer industry a Steelstrapper that tensions, seals and cuts steel strapping automatically . . . all with air power. Called the A4 Pneumatic Steelstrapper, this new tool includes one-hand controls among its many features.

With steel strapping quickly and easily inserted, the operator merely presses a control on the handle to power-tighten strapping to predetermined tension. And then with another power control on the same handle, magazine-fed seals are applied and the steel strapping cut without waste or operator effort.

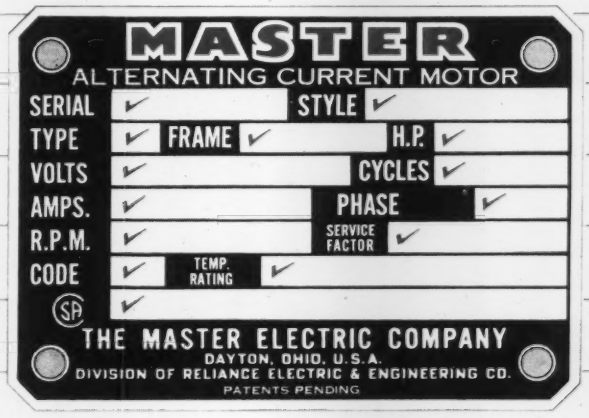
Your *Acme Idea Man can demonstrate the new A4 Pneumatic Steelstrapper and show you its many time, effort and money saving advantages. The first full-power tool of its kind, the new A4 Steelstrapper will give maximum performance in your steel strapping application.

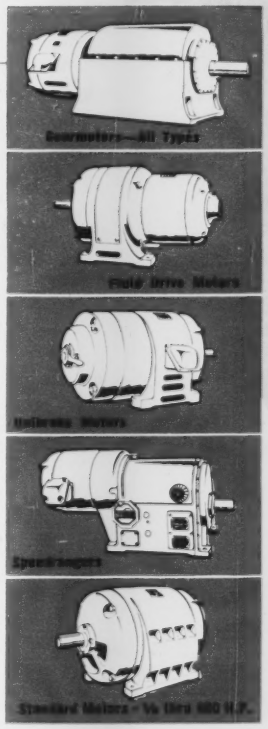
Contact your Acme Idea Man at the nearest Acme Steel Company office. Or write: Dept. SDS-48, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Ave., Toronto 13, Ontario.

Ask your Acme Idea Man, or write, for your free brochure detailing the features of the new fully powered A4 Steelstrapper.

ACME STEEL **STEEL STRAPPING**

YOU PICK THE FIGURES
THEN FIGURE ON MASTER





Regular and Specialized Package Drives—

1/8 THRU 400 H.P.

Your drive requirements are peculiarly your own—and you want ultimum performance, not compromise. So it's only good sense to talk over *all* drive requirements here at Master, where you can literally write your own ticket while choosing from the widest selection in the nation.

If one of our standard motors (1/8 thru 400 H.P.) doesn't fill the bill, you'll find that all specialized Master components are engineered to form a combination of units in one streamlined, compact package of efficiency. And that's whether you need something special in gear reduction — electric or dynamic brakes — variable speed operation — fluid drive or special mountings!

Three more things you can figure on! All the engineering help you want — quality control as *you'd* want it — honest deliveries. When can we get together?

Motor Ratings. . . 1/8 thru 400 H.P. All phases, voltages and frequencies.

Motor Types. . . . Squirrel cage, slip ring, synchronous, repulsion-start induction, capacitor, direct current.

Construction. . . . Open, enclosed, explosion-proof, fan-cooled, splash-proof, special purpose.

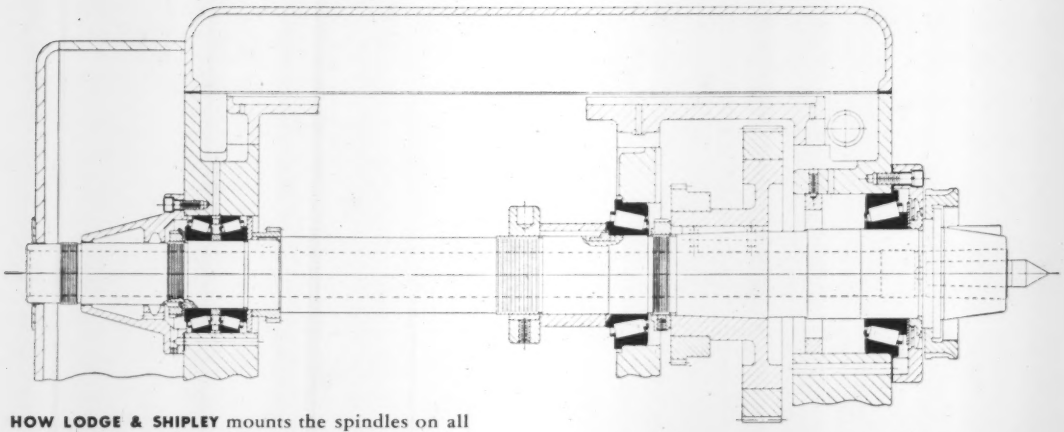
Speeds. . . . . Single speed, multi-speed, and variable speed.

Installation. . . . Horizontal or vertical with or without flanges and other features.

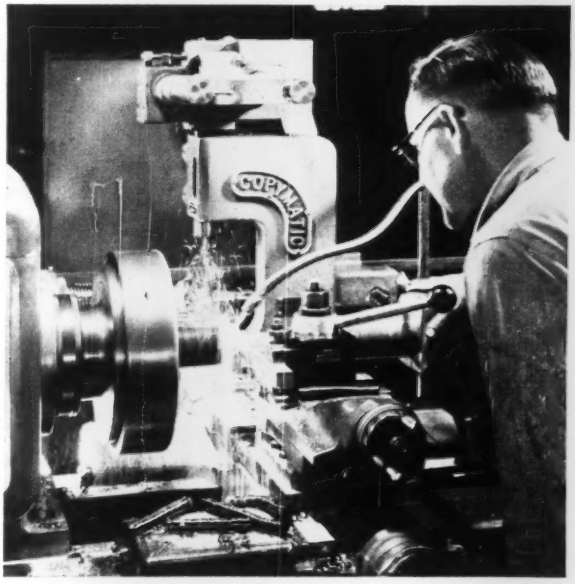
Power Drive Features. . . . . Electric brakes (2 types)—5 types of gear reduction up to 432 to 1 ratio. Mechanically and electronically controlled variable speed units — fluid drives — every type of mounting.

THE MASTER ELECTRIC COMPANY Dayton 1, Ohio

DIVISION OF RELIANCE ELECTRIC AND ENGINEERING CO.



HOW LODGE & SHIPLEY mounts the spindles on all 2013 Powerturn lathes including both 45° and 90° Copymatics on Timken bearings to get extra rigidity, maintain accuracy, reduce maintenance.



New type lathe ups production 200%, saves users an estimated $8,000 a year

...one secret—TIMKEN® bearings on the spindle

"Production increases as high as 200%"..."Overall savings estimated at $8,000 a year"—read user reports about the new 2013 Powerturn 90° Copymatic Lathe. One important reason for such exceptional results is that Lodge & Shipley mounts the spindle on Timken® tapered roller bearings. Timken bearings give it the vital extra rigidity and hold runout to the minimum needed for tracer accuracy.

How spindle is held rigid. Timken bearings hold the spindle in positive alignment. They take *both* radial and thrust loads in any combination, because of their tapered design. And because of full line contact between rollers and races, Timken bearings have extra load-carrying capacity.

Why heavy shocks are absorbed. Case-carburization of Timken bearings' rollers and races gives them hard, wear-resistant surfaces and tough, shock-resistant cores.

How friction is virtually eliminated. Timken bearings are geometrically designed to roll true. And they're precision-made to live up to their design. They run smoother—last longer.

We even make our own electric furnace fine alloy steel, for extra quality control. We're America's only bearing maker that does. To get all these advantages, always specify bearings trade-marked "TIMKEN". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD